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Mamm
A HAND-BOOK
TO THE
PRIMATES.

BY

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etc., etc., etc.*

VOL. I.

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PREFACE.

THE great increase in our knowledge of animals which has taken place since the volume on Monkeys was published in "Jardine's Naturalist's Library" some sixty years ago, cannot be better illustrated than by the fact that our excellent contributor, Dr. H. O. Forbes, has found it impossible to compress that knowledge into a single volume of the present issue. There is, moreover, no Museum which contains such a complete series of skins of the Primates, as to render a perfect "monograph" of the Order possible. Dr. Forbes has endeavoured in these volumes to bring the subject up to date, and has devoted some years of study to the two which now appear under his name, and he has had the great advantage of having seen many of the species of which these volumes treat, in a state of nature. If diligent research and patient work, combined with a sound anatomical knowledge and an acquaintance with many species of Monkeys in their natural habitat, avail anything, then these volumes should present to the student a more concise epitome of the characteristics of the Primates than any other essay yet offered to the public. It has been found impossible to reproduce any of the plates in the old "Naturalist's Library" of Jardine. They would have formed, with appropriate inscriptions, a very good instalment of a series of "Comic Natural History" volumes, as they were, in fact,

nothing but a set of extraordinary caricatures of Monkeys. I have, therefore, again to acknowledge the liberality of the publishers, in adopting my suggestion that a perfectly new set of illustrations should be prepared. These have been executed by Mr. J. G. Keulemans, with a result, I hope, that will satisfy the reader.

R. BOWDLER SHARPE.

INTRODUCTION.

IN the first volume will be found an account of the *Lemuroidea*, and the *Anthropoidea* as far as the group of the Macaques of the family *Cercopithecidae*. The second volume continues with the latter genus, and contains the rest of the Monkeys, and the Apes, as well as a summary of the geographical distribution of the species of the Order Primates.

I have not attempted to write a complete synonymy of the species of Monkeys. The literature is scattered over many, often obscure, periodicals, and without seeing the actual specimens described by some of the older writers, it would be easy to introduce a great deal of confusion into the synonymy. I have, therefore, only attempted to give the principal references.

I must express my obligation to Dr. Günther, F.R.S., the Keeper of the Zoological Department in the British Museum, for the facilities of study afforded to me in that institution. To Mr. Oldfield Thomas I am likewise greatly indebted for much assistance, and for many a kindly hint.

Dr. Forsyth Major, who is well-known as one of the foremost authorities on the Lemurs, not only gave me valuable information as to the species and literature of the *Lemuroidea*, but was even so good as to furnish me with the descriptions of several new species.

Lastly, to my friend the Editor, I have to return my sincere thanks for the patience with which he has revised my MSS., and for the verification of numbers of references, only to be found in the great libraries of London, and inaccessible to an author dwelling in the provinces.

HENRY O. FORBES

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MAMMALS.

ORDER PRIMATES.

LEMURS, MONKEYS AND APES.

INTRODUCTION.

OF the varied forms of animal life that people the globe, those that possess a back-bone and two pairs of limbs (the VERTEBRATA) are considered the highest in the scale. Of the *Vertebrata*, those are held to be of superior organisation which possess warm red blood and suckle their young with milk from the breast (*i.e.*, MAMMALIA). Our present volume deals with the highest and most specialised group of the Mammalia, and, therefore, of the whole Animal Kingdom.

Man, in respect of his mental endowments, stands alone and unapproachable among living creatures. Considered as to his "place in nature," however, he must be described as an erect-walking Mammal, possessing anterior extremities developed into hands of great perfection, for exclusive use as tactile and grasping organs, and posterior limbs, on which his body is perfectly balanced and entirely supported, exclusively devoted to locomotion, as well as highly specialised cerebral characters. These attributes in part constitute the standard by which we estimate superiority in animal structure, and fitness of adaptation.

Notwithstanding the numerous varieties and races of man-

kind distributed over every region of the globe, each exhibiting differences in habits, customs and superficial complexion, Man forms but one species, *Homo sapiens*, the sole representative of the unique genus of his family. Though the genus *Homo* is thus far apparently zoologically isolated, there is a remarkable group of animals, which we designate "Apes," and which, possessing many of the same structural characters more or less modified, stand apart from all the other Mammalia, and make a distinct approach to Man. Between Man, however, and the Apes, even the untrained eye at once perceives, amid obvious marks of inferiority, unmistakable resemblances, while anatomical investigations reveal that "the points in which Man differs from the Apes most nearly resembling him, are not of greater importance than those in which the Ape differs from other and universally acknowledged members of the group." (*Flower and Lydekker.*) The Apes, on the other hand, are so nearly related to the Monkeys, the Baboons and the Marmosets, by characters which insensibly merge into each other that they, along with Man, must logically be embraced in the same zoological division. The animals known to us as Lemurs, called by the Germans "Half-Apes" and by the French "False-Monkeys," are the nearest to the Apes and Man of all the remaining Mammals, though there are many points of divergence from the above-named groups. The Lemurs, in fact, exhibit considerable affinity to lower forms of Mammalia, especially to the Insectivora, but in internal structure and habit they approach the Anthropiform* group just referred to—in the flattened form of the digits, the opposable great toe, with its ankle-bone (the ento-cuneiform) rounded for its articulation, as in the higher Apes and Man.

* *ἄνθρωπος*—Man.

The Lemurs have, by many distinguished naturalists, been relegated to a distinct Order quite separate from the latter; but by such pre-eminent authorities as Linnæus, Lesson, Huxley, Broca and Flower, they have been assigned a subordinate position within that great Order, on which has been conferred the rank of the Primates of the Animal Kingdom.

The Order PRIMATES, therefore, comprises two very homogeneous sub-orders—(1) The Lemur-like animals (LEMUROIDEA) including the Aye-Aye, the Tarsier, and the True Lemurs; and (2) the Man-like animals (the ANTHROPOIDEA), which embrace the Marmosets, the Baboons, the great Apes, and Man.

In common with all other Mammals, the Primates are furnished with an epidermal covering, which, except in Man, consists of a woolly or hairy fur. They possess four limbs and a tail, which may be long, short, or concealed, and which is often used as a prehensile organ. The young are born in a condition of greater or less helplessness, with their eyes, as a rule, unopened, and the framework of their bodies incompletely ossified, and consequently requiring protective care and entire nourishment from the mother, for a considerable period. At maturity this skeleton consists of a skull, a breast- and a back-bone of many pieces, ribs, jointed limbs, and a pair of collar-bones. As a knowledge of many of these bones and some of the more prominent organs of the body are necessary for an accurate comprehension of the description and classification of the animals discussed in this volume, a few of the more important must be briefly referred to.

The *cranium*, formed of many bones firmly united together, consists of a cerebral region, or box, containing and guarding the brain, and a facial region, in which are situated, besides the mouth, the organs of sight and smell. The bones connected with the

mouth are the two maxillæ, along the margins of which are placed the grinding- or cheek-teeth ; the two pre-maxillæ, in which are set the cutting- and the eye-teeth ; and lastly, the palatine bones which form the roof of the mouth. Hinged on to the sides of the cranium is the toothed mandible, or lower jaw, composed of two halves, which may be solidly or loosely joined together in the mid line, or symphysis. Along the under surface of the skull, there are, besides the great (often posterior) orifice for the entrance of the spinal cord, numerous *foramina*, or openings, for the passage of blood-vessels for the nourishment of the brain, and of nerves which bring all parts of the body into relation with the supreme directing centre. Conspicuous near its posterior part, on each side, is an ivory like capsule, the periotic bone, containing the essential organ of hearing. Lying beneath the lower jaw is the hyoid arch, a slender framework of bones, supporting the tongue and the upper end of the windpipe with the organ of voice. In a few of the Monkeys and Apes certain of the bones of this arch are much enlarged and hollowed for increasing the volume of sound emitted by them. On either side of the great opening which is so conspicuous at the hinder part of the skull, for the reception of the spinal cord, is a smooth kidney shaped surface, called a "condyle." These two condyles serve for the articulation of the first segment of the back-bone to the cranium, and by the possession of this pair of condyles the Mammalian skull can always be distinguished from that of Birds and Reptiles. The pieces of which the back-bone are composed are named the *vertebræ*. Those of the neck, the "cervical" vertebræ, are recognised by having no true ribs attached to them, and are, in all Primates, seven in number. Those of the back, or "dorsal" vertebræ, may be distinguished by having articulated to them, on each side,

a movable rib, the other end of which is attached to the breast-bone ; they follow next to the cervical vertebræ, while to them succeed the “lumbar” vertebræ which carry no complete ribs. The dorsal and lumbar segments vary in number, but together they rarely exceed seventeen. Behind these extend the “sacral” vertebræ—completely ossified together, and lastly, the bones of the tail or “caudal” vertebræ, which may be many or few, according to the length of that appendage.

The fore-limb is composed of three segments, the arm, forearm, and hand, together with a block by which it is attached to the side of the body. To this block—the blade-bone or *scapula*—is articulated the arm-bone, or *humerus*, which at its elbow-joint hinges with the two bones, the *ulna* and the *radius*, of the fore-arm, on which in turn the hand is rotated. The hand is made up of three parts, the wrist-bones, or *carpus*, closely united together in two transverse rows with a central bone intervening between them ; next the elongated bones of the palm of the hand, or *metacarpus*, one to each finger, and lastly the *phalanges*, or finger-bones, three to each digit, except in the thumb, where there are but two. The hind-limb is formed on exactly the same plan. It has a connecting block—the pelvis ; giving suspension to the thigh, with its single bone, the *femur*, to which articulates the leg, with two bones (*tibia* and *fibula*), and the tripartite foot, composed of *tarsus*, *metatarsus*, and *phalanges*.

Of the digestive organs of the Primates the teeth present very important characters, from the point of view of the classification of the Order. They differ in form and number, and have distinct functions to perform. The teeth situated in front are the *incisors* and *canines*, sharp and pointed, for seizing, cutting, and holding the food. Behind them come the *pre-*

molars, and still further back the *molars*, both with broad crowns of complicated tubercles and ridges for milling the hard portions contained in the food. Animals provided—as all the Primates are—with these different sorts of teeth, are said to be *Heterodont*,* in contradistinction to forms like the Dolphins and Whales, which are termed *Homodont*,† because the whole of these teeth are of the same pattern. The Primates are *Diphyodont*‡ as well, because many of their permanent teeth are preceded by another set, commonly known as the *milk-teeth*. In order to present to the eye at a glance the number of each sort that any species possesses, a *dental formula* has been adopted by naturalists. Such a formula as $I\frac{2}{2}, C\frac{1}{1}, P\frac{3}{3}, M\frac{3}{3} = 36$, indicates that in *one half of the mouth*, above and below, there are 2 incisors, 1 canine, 3 pre-molars, and 3 molars = 18; and therefore in the *two halves* of the mouth together there are 36 teeth in all.

The masticated food, partially digested by the saliva of the mouth, descends the gullet by the muscular contractions of its walls to the simple, sac-like, stomach, and thence to the intestines. These latter consist of two portions, one smaller and narrower, nearer to the stomach, and a second portion further down, larger and wider; the junction of the two portions being marked by a process of varying length, the *cæcum*. The stomach and intestines, with other important structures, such as the liver, kidneys and generative organs, are contained in a lower cavity, separated by a muscular midriff, the diaphragm, from the upper part or thorax, containing the blood-purifying and pumping organs, the lungs and the heart.

* *ἑτερος*, different, *ὀδούς*, a tooth. † *ὁμός*, the same, *ὀδούς*, a tooth.

‡ *διφύης*, double, *ὀδούς*, a tooth.

The upper part of the windpipe is, in all Primates, modified to form the larynx, or organ of voice, constituted by fibrous strings stretched across its orifice, where they may be set in vibration by the air, in its passage to and from the lungs.

The brain is relatively large in proportion to the body, and attains in the higher of the two sub-orders its most perfect development. The main brain (or cerebral hemispheres), when viewed from above, in size preponderates over, and conceals (except in the Lemurs) all the other parts of that organ. The surface of its lateral halves, which are connected by transverse bands so as to insure harmony of action between them, is marked by fissures and foldings, or convolutions, which vary in number and complexity, evidently in relation to the intelligence of the animal. The brain within the skull gives origin to the nerves for the chief organs of sense ; while from its posterior part it is continued along the back—within a canal formed by the neural arches of the vertebræ—as the spinal column, from which arise the rest of the nerves for the body.

The young of all the Primates are nourished in the mother's womb by the passage of material from the blood-vessels of the parent through an organ known as the *placenta*. They are all born in a helpless condition, and remain unable to look after themselves for a considerable period, during which they are dependent on the milk secreted on the ventral surface of the mother by two or four glands, the teats or *mammæ*—those characteristic organs from which the “Mammalia” have derived their name. These glands are present in both sexes, but are functional only in the female.

We shall now proceed to describe more minutely the first of the two sub-orders of the Primates—the Lemur-like animals.

I. THE LEMURS—SUB-ORDER LEMUROIDEA.

The Aye-Aye, the Tarsier, and the True Lemurs constitute this first sub-order. They are characterised by having the



Fig. 1. Lemuroid Ear.



Fig. 2. Anthropoid Ear.

muzzle long and narrow, more or less Dog-like in shape, and the upper lip often divided into two by the nose-pad. The external ears (Fig. 1) are enlarged, with flattened margins, but have no "hem" as in the higher Anthropoids. (Fig. 2.)

The trunk is relatively long and compressed, and the tail when long is never truly prehensile. Of the limbs, the posterior are longer than the anterior, and all have five digits, each bearing a flat nail except the second toe, which has invariably a long pointed claw, their tips ending in prominent discoidal tactile pads. (Fig. 3.)

Of the digits, the index is sometimes quite rudimentary, while the thumb is large, and the great toe especially so, both being opposable. Teats occur on the breast, on the abdomen, or on both.

Of the skeleton, the eye-sockets, or orbits, are directed forward, and have complete bony margins, which, however, are not

closed in by bone behind (as in Monkeys), but freely communicating beneath the post-orbital process (except in *Tarsius*) with the temporal hollow behind. In the young of some species the orbit is more enclosed than it is in the adult: the orifice for the lachrymal duct of the eye is placed external to the margin of the orbit: the hollow for the olfactory lobes of the brain is always large.

Having four kinds of teeth, and a set in succession to the milk-teeth, they are Heterodont and Diphyodont. The dental formula is $I_{\frac{2}{2}}^2, C_{\frac{1}{1}}^1, P_{\frac{3}{3}}^3, M_{\frac{3}{3}}^3 = 36$ (*vide* anteà, p. 6), and the upper jaw has a toothless space in the centre (except in the Aye-Aye). Of the upper teeth, the *incisors* are sometimes absent, but



Fig. 3. Foot of *Chirogale trichotis*, Günther.
(P. Z. S., 1875, p. 79.)

generally present; if unequal in size the inner one is the larger of the two. The canines are prominent; the pre-molars all have a *cingulum*, or girdle, round the base, more or less enlarged backwards into a process ("talon" or "heel"); the anterior pre-molar vertically long and canine-shaped; the median and posterior with three main points (tubercles or cusps) and one or two smaller ones on the crown, and having a bar or ridge uniting the front inner with the hind outer cusp. The anterior and median *molars* have three or four main cusps, and one

or two smaller or subsidiary ones on the crown ; the cingulum is well developed. The posterior molars have generally three cusps.

In the lower jaw the *incisors* are close-set and comb-like, remarkable for protruding in front, like the teeth of a Rat or a Rabbit. The *canines* also protrude horizontally, and, being placed alongside of the incisors, are difficult to distinguish from the latter excepting that they are broader and thicker.

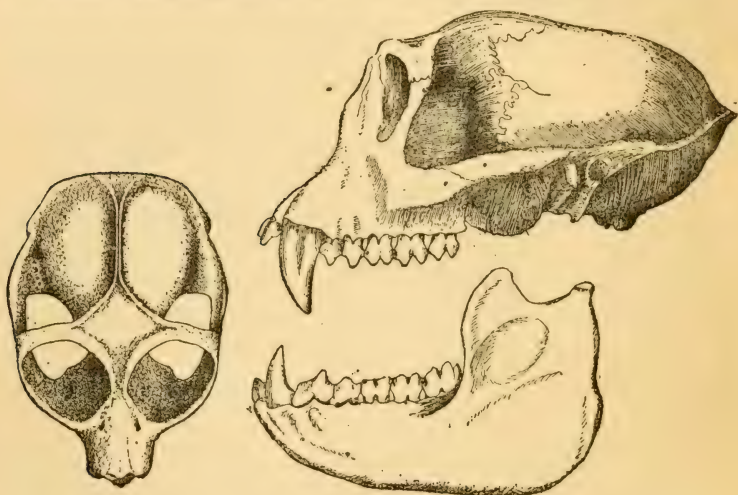


Fig. 4. Skull of Lemuroid.

From Blanford's "Mammalia of British India" (by permission of the author).

Fig. 5. Skull of Anthropoid.

From Blanford's "Mammalia of British India" (by permission of the author).

Of the *pre-molars* the anterior are canine-shaped, the median and posterior ones have three main, and one or two subordinate, cusps on the crowns. In both the upper and lower *molars*, cross-bridges stretch between the outer and inner front cusps as well as between the outer and inner hind cusps.

There is an oblique ridge between the hind outer and the front inner cusp, and another is often present between the front outer cusp and the anterior "heel," producing, as Huxley has pointed out, almost a double crescentic pattern, as in many lower Mammals. The posterior molar has four or five cusps.

Of the *milk-teeth*, the incisors in the upper jaw change first. Of the molars, two are developed before the change of the pre-molars. In the lower jaw the incisors change first, and when two or three pre-molars have developed the last molar has still to come.

The arm-bone, or *humerus*, has one perforation (*entepicondylar foramen*) on its inner margin, and another above the joint (except in *Perodicticus*). The bones of the fore-arm (*radius* and *ulna*), and those of the leg (*tibia* and *fibula*) are not co-ossified (except in *Tarsius*), so that the palm or sole can be turned up at will.

The bones of the *digits* are more or less flat and rounded at the tips (differing in this respect from the *Insectivora*). One of the ankle-bones, for the articulation of the opposable great toe, the ento-cuneiform, as it is called, is rounded, as in the Anthropoid Apes and Man. The thumb is opposable, but its articulating bone in the wrist is not rounded, except in *Avahis* and *Indris*, which genera agree in this respect with *Anthropopithecus* and Man. The wrist has its central bone (*os centrale*) present ; it is absent in Man and the higher Apes.

The knee is free and not united to the side of the body by integument.

The two halves of the lower jaw are not always co-ossified (as is the case in the *Anthropoidea*).

The opening in the base of the skull (the *foramen rotundum*) which transmits from the brain a branch of the fifth nerve

for the upper jaw, and the sphenoidal fissure, which gives exit to the third, fourth and sixth cranial nerves, have but one aperture, as in the Rabbit, which belongs to the *Rodentia*.

The sacral vertebræ are generally three in number, and the lumbar and dorsal together vary from nineteen to twenty-three.

The brain, as Sir William Flower has observed, departs considerably from the form of what may be called the primatial type, and approaches in form to that of the carnivorous animals. The hind-brain, or *cerebellum*, is not completely covered by the cerebrum. The latter has but few convolutions (indicating a low intelligence), but its posterior lobe is always present, though more or less rudimentary, and so also are many fissures, which are characteristic of its surface in the higher Primates. The olfactory lobes are usually large and not covered by the cerebrum.

The uterus and structures for the nutrition of the young prior to birth are low in type, and approximate to the conditions seen in the Pig, the Horse, the Chevrotains, and the Ruminants. The unborn Lemur is often encased (as among the Sloths) in a skin-like covering (*epitrichium*) which breaks into patches before birth.

The tongue has a horny supplementary under-tongue (*sublingua*) attached beneath it. The stomach is simple, not formed of several compartments. The transverse portion of the great intestine is convoluted in a remarkable manner upon itself, the cæcum also being very large. The main arteries of the arm and leg break up (as in the Sloths) into an immense number of small vessels (called *retia mirabilia*) parallel to one another instead of being simple branching trunks.

The long tendons of the muscles for flexing the digits (the

flexor longus digitorum) differ generally in arrangement from those of the higher Primates.

The Lemuroids are of no commercial value to Man.

As regards their distribution, the *Lemuroidea* are now absolutely confined to the Old World, and predominate in the island of Madagascar, where, as M. Grandidier remarks in his magnificent work on that country, there is scarcely a little wood in any district in which they are not found. Indeed, of the nearly seventy species of Mammals inhabiting that island, thirty-five, or one-half, are Lemurs. Members of the family also occur across the whole of the neighbouring continent of Africa, but their northern range does not reach quite to the tropic, whereas it extends some few degrees beyond it in the Southern Hemisphere. Elsewhere they are confined to the forests of the Oriental region. More or less isolated in Southern India, they re-appear in China, and spreading south to Java they reach as far east as Celebes and the Philippine Islands. The present isolation of the Lemurs in two such distant areas—in Africa and Madagascar and some of the Mascarene Islands on the one hand, and in Southern India, China, Ceylon, and the Malayan Islands on the other—has been considered by some naturalists as weighty evidence in favour of a former land connection between these distant regions.

Though so restricted in their distribution at the present day, this group was more widely represented in past ages of the world's history, as we shall have to point out later on. Abundant fossil remains prove that they lived in Europe and in North America, where to-day they are quite unknown.

The *Lemuroidea* are almost entirely arboreal, and seldom come to the ground, except the Sifakas, which then progress

on their hind legs by a series of bounds, holding their hands over their head in a ludicrous fashion. Most of them are nocturnal, or crepuscular, sleeping the greater part of the day in holes or on a branch of a tree coiled up in a ball. Their food consists chiefly of leaves, fruits, honey, birds' eggs, and birds, or any small animals they can pounce upon.

The Lemurs now living are divided into three families. The Aye-Aye and the Tarsiers, on account of their very special characters, constitute each a distinct family—named *Chiromyidæ* and *Tarsiidæ* respectively—while the True Lemurs form the third, the *Lemuridæ*, to which all the remaining forms belong.

THE AYE-AYES. FAMILY CHIROMYIDÆ.

This very aberrant family contains only one species; the characters of the family and of the genus *Chiromys* are, therefore, necessarily those of the single species known.

THE AYE-AYE. CHIROMYS MADAGASCARIENSIS.

Sciurus madagascariensis, Gmel., S. N., i., p. 152 (1788).

Daubentonia madagascariensis, Geoffr., Décad. Philos., iv., p. 193 (1795); Dahlbom, Studia, p. 326, t. 12.

Chiromys madagascariensis, Cuv., Leçons d'Anat. Comp., Tabl. de Class., 1 (1800); Owen, Tr. Z. S., vol. v., p. 33; Peters, Abhandl. K. Akad. Berlin, 1865, p. 79.

(Plate I.)

Characters.—Head short and round; face short-snouted, with a patch of bristles below the eye, between the ear and the angle of the mouth; eyes round, prominent; eyebrows long and bristly; pupils wide, furnished with a false eyelid (a nictitating membrane); ears large, rounded, directed backwards,

naked, and studded with small protuberances; tail longer than the body, bushy, with hair 3-4 inches long; hind-limbs longer than the fore-limbs, the thigh-bone being one third longer than the humerus, the hand the longest segment of the fore-limb; fingers long—the fourth the longest—with compressed and pointed claws, which are proportionately much longer than the toes; the middle or third digit slender and very remarkable, being extremely attenuated and wire-like; thumb opposable, and placed at an acute angle to the short index; great toe opposable, set at an open angle to the other digits, its nail flat; the remaining toes with pointed compressed claws (like the second toe of *Lemuridae* and second and third of *Tarsiidae*). Teats, two, placed low down on the abdomen. Length of body and tail together 36 inches. Skull highly arched, convex transversely; muzzle short and deep; bony palate not extending behind the middle of the posterior molar tooth; lower jaw with condyle elongated from before backwards and on a level with the cheek-teeth, its two halves united at an acute angle by elastic tissue, allowing each half to play independently of the other. Its dental formula, $I \frac{1}{1}, C \frac{0}{0}, P \frac{1}{0}, M \frac{3}{3} = 18$. Incisors very large, curved, with persistent pulp, and enamel only in front, growing up as fast as worn away; canines absent (the last two characters as in the Rodents); long vacuity between canines and pre-molar; pre-molar much smaller than molars; molars with flat crowns and very indistinct tubercles; milk-teeth agreeing more in number and form with those seen among Lemurs than with the permanent set; the upper jaw having its full set of two incisors, one canine, and a pre-molar tooth present; the lower jaw having one incisor, no canine, and one pre-molar tooth on each side. Dorsal and lumbar vertebræ together 18, sacral 3, and caudal 22-27.

Olfactory lobes of brain covered by the cerebrum; convolutions and grooves of cerebrum similar to those in normal Lemurs. Intestine 26 inches long; no striped tissue in the muscular sheath of the gullet at the anterior end of the stomach. Di-gastric muscle (for moving the jaws) very much developed in accordance with the great gnawing powers of the species.

Fur on back, flanks, tail, and limbs dark brown, nearly black, but with the white of the basal half of the hairs shining through; hair woolly at base; long hairs on top of head and back of neck tipped with white; short hairs of face dirty white. Nose and lips naked, flesh-coloured; ears black; sides of head and throat greyish-yellow; chest often bright yellow, the chin paler. Inner sides of limbs yellowish-white, and on the under surface of the body the basal part of hairs showing through, producing a pale yellowish-white, or sub-rufous, colour. Feet and digits black. Tail black, at its base greyish-white or greyish-brown, and often with long white hairs throughout. The species is more nearly related to the members of the genus *Galago* to be described later on, than to any other of the *Lemuroidea*.

Distribution.—The Aye-Aye is confined to the island of Madagascar. It makes its home in the dense parts of the great forest that runs along the eastern border of its central plateau, but only in that part of it which separates the Sihànaka Province from that of the Betsimisàraka, which is about 25 miles from the east coast, in latitude $17^{\circ} 22' S$. It is more common than has been supposed, its nocturnal habits and the superstitious awe with which it is regarded accounting for its apparent rarity, and for the contradictory reports given of its habits.

Habits.—The Aye-Aye, whose name is derived from its call of "hai-hay," is one of the most singular of living animals. It was first discovered by Sonnerat during his travels in Mada-

gascon in 1780, and by him sent to Paris. The skin remained unique in Europe for the best part of a century. Greatly owing to the superstitious dread in which the creature is held by the natives, it was for a long period, and is still, very difficult to procure, or to induce the natives to capture, specimens. Mr. Baron says that it is sometimes accidentally caught in traps by the natives, "but the owner of the trap, unless one of those versed in the Aye-Aye mysteries who know the charm by which to counteract its evil power, smears fat over it, thus securing its forgiveness and goodwill, and sets it free." In 1863 Dr. Sandwith sent a second example to Europe, the anatomy of whose body was made the subject of an exhaustive monograph by the late Sir Richard Owen. Since that date more than one specimen has been received alive, and its habits and constitution are now fairly well known. The Aye-Aye is entirely arboreal and nocturnal, sleeping during the day, with its body coiled round, lying on its side with its bushy tail spread over it as a covering. It suspends itself by its hind-limbs, and in this position it has been observed in captivity by Mr. Bartlett, using its hook-like finger to comb out its tail, to cleanse its face, the corners of its eyes, its nose, mouth, and ears, keeping meanwhile its other fingers closed. It lives in the depths of the forests, going about in pairs. Exquisitely keen of hearing, it can detect by sound the boring of insects within the dead branches of trees. Its attenuated wire-like finger acts as a probe to discover their position, and its powerful incisor teeth are used to cut down upon the tunnel of its prey, which consists principally of the *Andraitra*, the larva of a Beetle, which it then extracts with the same digit. The juices of plants are also supposed to form part of its food. It drinks after the manner of many Monkeys, by dipping its fingers into the water, and

drawing them through its mouth. The Aye-Aye is fearless of Man, but in its wakeful hours, during the night, when irritated it can be very savage and strike out with its hands. The female produces but one young at a birth, and builds, in the fork of a tree, a ball-like nest, two feet in diameter, with an entrance hole in the side, forming it of the rolled up leaves of the Travellers'-tree, and lining it with small twigs and dry leaves. (*Baron.*)

THE TARSIERS. FAMILY Tarsiidæ.

This family, like the preceding, has been constituted for the reception of two animals which are so remarkably distinct from all the other species of Lemurs, as to necessitate their being thus segregated. Between these two forms however, so close a relationship exists, that they have often been considered as only varieties of the same species. The family, therefore, consists, as in the *Chiromyidæ*, of a single genus, the characters of which constitute also those of the family.

THE TARSIERS. GENUS Tarsius.

Tarsius, Storr. Prod. Method. Mamm., p. 32 (1780).

The Tarsiers are distinguished externally by the possession of a rounded head, and a very short, pointed muzzle ; by their very large, long and naked ears, and eyes so remarkably large and protruding, as to form the most prominent feature of the face. The hind-limb, which is much longer than the fore-limb, is also very remarkable on account of the great elongation of the ankle-region (or tarsus) of the limb. The long and slender toes terminate in round, sucker-like discs, and are furnished with flat nails, except on the second and third toes, where the nails are merely compressed claws. The fore-

limb, with or without the hand, is longer than the trunk ; its digits also are long and slender (the third being longest, and the second equal to the fourth) and, like those of the foot, terminate in round sucker-like discs. Both the wrist and ankle are haired.

The long and Rat-like tail is longer than the body, and has a tufted termination. The skull presents enormous eye-cavities, the inner margins of the latter almost meeting in the centre. The orbits are nearly closed in from the temporal fossa by the union of the malar and alisphenoid bones—a character in which they differ from all other Lemurs, and approach the Anthropoid section of the Primates. Their dental formula is $I_{1}^{2}, C_{1}^{1}, P_{3}^{3}, M_{3}^{3} = 34$. Of the upper jaw, the incisors are prominent and unequal, the anterior ones being larger than the posterior, and in contact in the middle line, thus leaving no central gap in the front of the jaw, as is the rule among Lemurs ; the canines are about as long vertically as the inner incisor, and are smaller than the corresponding tooth in the True Lemurs ; the pre-molars are canine-like, sharp, pointed, and furnished with a cingulum ; the anterior pre-molar is smaller than the two others ; the posterior pre-molar has one external and one internal cusp ; the molars, all nearly equal in size, are wide transversely, strongly cingulate, and have two prominent external cusps. In the lower jaw, the solitary incisor in each half is small, and, instead of protruding horizontally, is nearly erect ; the canines are also almost erect, and less like incisors than is usual in the Sub-order. The pre-molars are sharp, but the anterior is smaller than the two posterior ; the anterior and median molars have four cusps, and are cingulate, while the posterior molar has five cusps.

The Tarsiers have nineteen dorsal and lumbar vertebræ together, and twenty-seven in the tail. The humerus presents a perforation (the entepicondylar foramen) at its lower inner side, and another nearly in the centre above the hinge. The femur is more than twice the length of the arm-bone; the lower half of the slender fibula is co-ossified with the tibia, while two of the tarsal, or ankle-bones (the *calcaneum* and *naviculare*), are remarkably elongated, thus giving to the hind-limb of these animals the singular conformation from which they derive their name. The large intestine is not convoluted upon itself as in so many of the Lemurs, nor is there a cæcum at the junction of its smaller and larger portions.

I. THE SPECTRAL TARSIER. TARSIVS TARSIVS.

Lemur tarsius, Erxl., Syst. Regn. Anim., Mamm., p. 71 (1777).

Tarsius spectrum, Geoffr., Ann. Mus., xix., p. 168 (1812);
Dahlb., Studia, p. 231, tab. 11.

Lemur spectrum, Pallas, Nova Sp. Glir. Ord., p. 275, note (1778).

(Plate II.)

Characters.—On the upper lip, sides of nostrils, and over the eyes long, delicate black hairs (*vibrissæ*); hair on nose very short, longer in front of ears and at angles of mouth. Fur of body generally thick, woolly, the basal two thirds slate-grey, the terminal third brownish-yellow. Face to forehead fawn-brown, somewhat darker around and between the enormous liquid brown eyes. Top and back of head and shoulders of a more uniform and darker shade; rest of back apparently mottled, owing to the light-tipped hairs of that region gathering into locks. Under side of body, inside of arms and legs paler. Tail darker brown, rufous at base of upper side. Size not exceeding that of a small Rat.



THE SPECTRAL TARSIER

Distribution.—Found only in the jungles of the Malayan islands of Sumatra, Java, Banka, Billiton, and Borneo.

II. THE DUSKY-HANDED TARSIER. *TARSIVS FUSCUS*.

? *Lemur podje*, Kerr, Linn. Anim. Kingdom, p. 86 (1792).

Tarsius fuscus, s. *fuscimanus*, Fischer, Anat. der Maki, pp. 3, 7 (1784).

Tarsius fuscimanus, Geoffr., Ann. Mus., xix., p. 168 (1812);
Max Weber, Zool. Ergebn. Reis. Nederl. Ost-Indien, iii.,
p. 264 (1893).

Tarsius fischeri, Burm. Tarsius, pp. 29, 129 (1846).

Characters.—Closely related to the preceding species in size and other characters, but distinguished by the colour of the hands, which are dark brown.

Distribution.—Inhabits the islands of the Indian Archipelago, farther to the eastward than those in which *Tarsius Tarsius* is found. It has been recorded from Celebes, and the neighbouring groups of Salayer and Sanghir, and from some of the Philippine Islands, such as Bohol and Mindanao.

Habits.—The habits of both species of Tarsier are identical, and may be described together. They are almost entirely nocturnal and arboreal animals, rarely, of their own accord, coming to the ground. They move from place to place by leaping along the larger branches, or from tree to tree, even when these stand several feet distant. When they do descend, however, they advance on the ground by the same curious Frog-like leaps, without bringing their fore-limbs down to the ground. The Tarsier is said to climb easily, even without grasping, by means of the round discs on its slender finger-tips, which, like suckers, enable it to hold on by the side pressure of its limbs to any smooth surface, such as the stems of the bamboo-

brakes which it frequents. Mr. Charles Hose, in his "Mammals of Borneo," states that, in that island, the Tarsier is found in the jungles of the low country, skipping about from branch to branch. According to the notes of this excellent field-naturalist, it has a habit of turning its head almost completely round without moving the rest of its body. This very remarkable creature lives in pairs in the tropical forests, in holes in the tree stems, or under their roots, feeding chiefly on insects and small lizards, which, as Mr. Cuming has recorded, it holds by its fore-paws while devouring, sitting up the while on its posterior. In drinking it is also said to lap water like a Cat. The Tarsier seldom makes any kind of noise, but when it does emit a sound, it is a sharp, shrill call. The female produces one, rarely two, young at a birth; these are similar to the parents. They are covered with hair, and have the eyes open. Mr. Hose further states that the mother often carries her young one about in her mouth, after the manner of a Cat. On the second day after its birth, the infant Tarsier can move about by itself. By the natives of Sumatra, and, indeed, of most of the islands inhabited by these animals, the Tarsiers are held in superstitious dread, their presence in the neighbourhood of the rice-fields being supposed to portend misfortune to the owner or to some member of his family.

Their elongated ankle-bones, and their leaping habits, seem to indicate that the Galagos and the Chirogales, or Mouse-Lemurs, are the nearest relatives of the Tarsiers.

THE TYPICAL LEMURS. FAMILY LEMURIDÆ.

Under this family heading are included the whole of the remaining members of the Sub-order. They all possess certain main characters in common; but on account of the presence or

absence of certain subordinate features in some of the groups, the family has been further subdivided into four sub-families. The more important characters which they have in common are the thick woolly fur, the Dog- or Fox-like snout and nostrils — a character obviously distinguishing them from the bulk of the Monkeys, in which the nose forms a subsidiary feature, and is not the main part of the face,—and especially the number and form of their teeth. In the centre of the upper jaw there is always a toothless gap, or *diastema*, on each side of which the teeth are arranged according to the following formula: $I_{\frac{3}{2}}, C_1^1, P_{\frac{3}{3}}, M_{\frac{3}{3}} = 36$. Among the Endrinæ, however, the formula is $I_{\frac{3}{2}}, C_{1 \text{ or } 0}^1, P_{\frac{3}{2}}, M_{\frac{3}{3}} = 32 \text{ or } 30$ in number. In the upper jaw the incisors are small and perpendicular; but in the lower, where they are long and narrow, they protrude horizontally in front, and then follow, parallel and close to them, the somewhat thicker canines, the six teeth together forming a comb-like series. The anterior pre-molar is always vertically longer than the others, and assumes the form and function of the canines in other animals.

In some genera (e.g., *Propithecus*), Milne-Edwards has observed that in the young animal the cerebellum is more overlapped by the cerebrum (or main brain) than it is later in life; and Dr. Major believes that the *Lemuridæ* are highly specialised members of the Sub-order, developed from ancient types which were not unlike the American Monkeys of the family *Cebidæ*.

The Typical Lemurs are arranged in the following four subdivisions: The Pottos and Slow-paced Lemurs (*Lorisinæ*); the Galagos and Mouse-Lemurs (*Galaginæ*); the True Lemurs (*Lemurinæ*); and the Endrinæ (*Indrisinæ*)

THE SLOW-LEMURS. SUB-FAMILY I. LORISINÆ.

This Sub-family has been constituted to receive a small number of Lemurs, which, although occupying limited areas in two widely separated continents—one genus being African and the others Asiatic—present certain characters in common. They are recognised by having soft woolly fur, a triangular head and pointed face, very large and staring eyes, set close together, while their ears are naked along their margin. Their fore- and hind-limbs are nearly equal. In the Asiatic genera the index finger is very small, while in the African it is quite rudimentary and nail-less. In both groups the thumb diverges widely from the other fingers, and the great toe is directed



Fig. 6. Front Teeth of *Perodicticus*, *Nycticebus* and *Loris*, after Mivart (P. Z. S., 1864, p. 631).

backwards, but the ankle-bones of the foot are not elongated. The tail is either so short as to be quite concealed in the fur, or is less than one-third of the length of the body.

In the skull the squamosal region with the outer and posterior portion of the ear capsules (the periotic) are inflated. The dental formula of the Slow-Lemurs is the same as given above for the family generally. In the upper jaw, the two incisors are usually equal, but, if unequal, the inner incisor is always the larger (Fig. 6); the vertically long canine, which is separated by a gap from the anterior pre-molar, presents both in front and behind a neck or cingulum, which is cusped behind; the pre-molars are canine-like, and have the cingulum produced behind into a heel (or talon). The anterior of the three is verti-

cally longer than the median, while both the median and posterior have, to the outside, one main cusp with a minute one on each side of it, and two inner cusps; the molars are all cingulate, and have to the outside two main cusps (separated by a minute cusp) and two inner cusps, the outer and inner cusps alternating. Of the anterior and median molars, the two main outside cusps are sub-equal, and are flanked on each side by a minute cusp; the posterior molar is short and wide, and has only one minute cusp in front of its anterior main cusp. Of the lower jaw, the pre-molars are canine-like, the anterior being vertically long and having a posterior heel; the posterior pre-molar, which differs in size from the anterior, presents two main cusps to the outside and one minute cusp in front; the molars, both anterior and median, are four-cusped, with a minute cusp in front, the posterior being five-cusped, while all have their front cusps vertically taller than the hind ones.

Among the *Lorisinae* the dorsal and lumbar vertebræ together number from twenty-one to twenty-three. The cæcum, at the junction of the larger and smaller intestine, is long. The main artery of the fore- and hind-limbs breaks up into a *rete mirabile* of numerous small parallel branches.

The Slow-Lemurs are distributed in the western parts of the African continent, and in the Indian, Malayan and Indo-Chinese portions of the Oriental region. It is a remarkable fact that this group should be confined to one portion of Africa and be entirely absent from Madagascar, the country where the Lemurs form so characteristic a feature in the fauna.

The *Lorisinae* embrace three genera, the Pottos (*Perodicticus*) from the African continent; the Slender Loris (*Loris*), and the Slow-Loris (*Nycticebus*), both of which inhabit the Oriental region.

THE POTTOS. GENUS PERODICTICUS.

Perodicticus, Bennett, P. Z. S., 1839, p. 109 ; Huxley, P. Z. S., 1864, p. 235.

Arctocebus, Gray, P. Z. S., 1863, p. 150 ; Mivart, P. Z. S., 1864, p. 644.

This genus contains two species, both confined to the West Coast of Africa. The Pottos are slender-bodied animals, with oval heads and blunt Dog-shaped muzzles. Their eyes are large and full, and their external ears erect, with shelf-like lamellæ inside. They have slender and sub-equal limbs. The second digit of the fore-limb is rudimentary and nail-less ; it is supported on one wrist-bone, and has two phalanges or finger-bones. The great toe is opposable, and the fourth and fifth digits of both limbs are united together by membrane as far as the first joint. The processes of the vertebræ in the neck and back are long and protruding. The tail is very short.

The pre-maxillæ (which carry the incisor teeth) do not project in front, nor does the bony palate extend farther back than the end of the posterior molar teeth. Of the upper teeth the incisors are equal in size (Fig. 6) ; the median and posterior pre-molars have on their crowns three cusps, of which the two outer are the larger ; the anterior and median molars are cingulate, have four-cusped crowns, and are larger than the pre-molars ; the posterior is narrow from before backwards, and its crown presents only two or three cusps. Of the lower teeth, the anterior pre-molar is recurved and larger than the canine, with a ridge on its inner face and a cusped heel behind ; the median and posterior ones are shorter than their anterior fellow, each having a strong posterior cusped heel ; the anterior and median

molars have their crowns four-cusped and are nearly equal in length; the crown of the posterior molar is 4-5-cusped, and has a ridge joining its anterior heel to its front outer cusp. Transverse and oblique ridges are well marked on the crowns of both the upper and lower cheek-teeth.

I. THE CALABAR POTTO. *PERODICTICUS CALABARENSIS*.

Perodicticus calabarensis, Smith, Proc. Roy. Phys. Soc., Edinb., 1860, p. 172, figs. 1, 2.

Arctocebus calabarensis, J. E. Gray, P. Z. S., 1863, p. 150; Huxley, P. Z. S., p. 314, pl. 28 (1864).

Nycticebus calabarensis, Schlegel, Mus. Pays Bas, vii., p. 287 (1876).

Characters.—Hair long, wool-like; face, hands, and feet thinly

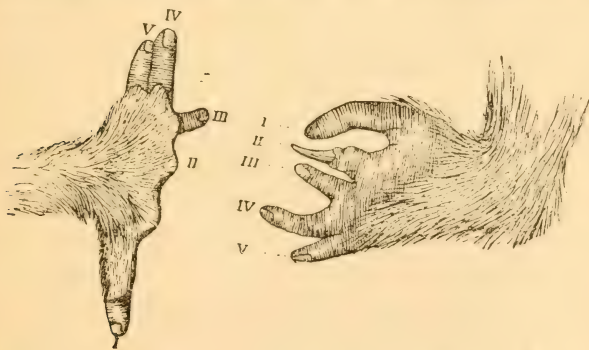


Fig. 7. Hand and Foot of *P. calabarensis* (after Huxley, P. Z. S., 1864, p. 319).

haired. Head $2\frac{1}{2}$ inches long, tapering in front; muzzle prominent and blunt; ears large, pointed, and projecting above the level of the head, with short hairs, two lamellæ inside, and marginal tufts; neck short; hind-limbs slightly larger and

longer than the fore-limbs ; hands smaller than the feet ; thumb thick, with a tubercle at base ; the wrist-bone of the very rudimentary index-finger supporting two rudimentary finger-bones ; third finger not parallel to fourth and fifth ; the fourth longest (Fig. 7). Great toe with a tubercle at its base, opposable. Tail $\frac{1}{4}$ inch long, hidden in the fur of the body.

Fur grey at base of hairs, fawn-coloured farther up, and tipped with dark brown, uniform over the body and limbs ; face darker ; sides of head lighter ; line from brow down the nose white. No vibrissæ on face and no eyebrows ; chin, throat, inner surface of limbs, and under side of body, greyish-white.

Posterior upper molar nearly equal to posterior pre-molar, with the hind inner cusp of the crown rudimentary. Lower incisors not visible beyond the lip, cingulate ; posterior molar five-cusped and relatively larger than in the next species (*P. potto*). Bony palate with large perforations behind the incisors. Intestines, 40 inches long ; cæcum, $2\frac{1}{2}$ inches.

Distribution.—The “Angwantibo,” as this species is called, is known only from Old Calabar, on the west coast of Africa.

II. BOSMAN'S POTTO. PERODICTICUS POTTO.

Potto, Bosman, Beschrijving van de Guinese Goudkust, ii., p. 32, fig. 4 (1704).

Nycticebus potto, Geoffr., Ann. Mus., xix., p. 165 (1812) ; Schlegel, Mus. Pays Bas vii., p. 287 (1876).

Perodicticus geoffroyi, Bennett, P. Z. S., 1830, p. 109.

Perodicticus potto, V. der Hoeven, Tijdschr. v. Natuurl. Gesch., xi., p. 41 (1844) ; Wagner, in Schreber's Säugeth. Suppl., v., p. 183 (1855).

Stenops potto, Pel, Bijdragen tot de Dierkunde, 1852, p. 41.

Characters.—More common than the Angwantibo and dis-

tinguished from it by its rounder, shorter, and wider head, less produced muzzle, smaller mouth, and eyes farther apart; ears shorter, rounder, and directed more backwards, with one lamella on the inner surface. Hands longer, flat and thin; index-finger not so reduced as in *P. calabarensis*. Tail very short, little more than an inch long, but visible beyond the fur. Length of body, 8 inches.

Upper pre-molars less canine-like than in the preceding species; posterior upper molar differing in size from and set farther out than the others, short and wide, with the crown elliptical and only two-cusped, the two hind-cusps wanting. Lower incisors more prominent and projecting than in *P. calabarensis*; crown of posterior lower molar four-cusped.

Adult.—Upper surface rich reddish-brown with a black dorsal stripe widening opposite the shoulders, and fading out towards the tail; under side yellowish or reddish-white. Hair on face shorter and paler, with a dark ring round the eyes.

Young.—Reddish-brown all over, redder on the back of the head and neck, darker on the shoulders; creamy-white, washed with rufous, beneath.

Fur silver-grey at the base of the hairs, with reddish-brown tips in younger, and dark golden-brown in older, individuals.

Distribution.—The Potto is one of the oldest known members of the Lemuroid group, having been described in 1704 by Bosman, who met with it on his voyage to Guinea. It was, however, lost sight of until 1825, when it was rediscovered in Sierra Leone and fully described by Bennett in 1830. It is known also from Gaboon.

Habits.—Both species of Potto are nocturnal and arboreal, and are exceedingly slow in their movements. In catching

insects or flies, which form part of their food, they proceed with extraordinary deliberation, never quickening their movements, and yet rarely, if ever, missing their prey.

Bosman in his description of the Gold Coast of Guinea, gives a woodcut of the Potto, which, he says, is a "Draught of a Creature, by the *Negroes* called *Potto*, but known to us by the Name of Sluggard, doubtless from its lazy, sluggish Nature; a whole day being little enough for it to advance ten Steps forward.

"Some Writers affirm, that when this Creature has climbed upon a Tree, he doth not leave it until he hath eaten up not only the Fruit, but the leaves intirely; and then descends fat and in very good case in order to get up into another Tree; but before his slow pace can compass this, he becomes as poor and lean as 'tis possible to imagine: And if the trees be high, or the way anything distant, and he meets with nothing on his journey, he inevitably dies of Hunger, betwixt one tree and the other. Thus 'tis represented by others, but I will not undertake for the Truth of it; though the *Negroes* are apt to believe something like it.

"This is such a horrible ugly Creature that I don't believe anything besides so very disagreeable is to be found on the whole Earth; the Print is a very lively Description of it: Its Fore-feet are very like Hands, the Head strangely disproportionately large; that from whence this Print was taken was of a pale Mouse colour: but it was then very young, and his Skin yet smooth, but when old, as I saw one at *Elmina* in the year 1699, 'tis red and covered with a sort of Hair as thick set as Flocks of Wool. I know nothing more of this Animal, than that 'tis impossible to look on him without Horror, and that he hath nothing very particular but his odious Ugliness."

THE SLENDER LORIS. GENUS LORIS.

Loris, Geoffr., Mag. Encycl., Ann. 2, i., p. 48 (1796).

Stenops, Illiger, Prodr., p. 73 (1811).

As this genus contains only a solitary species, its characters are necessarily those of the species.

I. THE SLENDER LORIS. LORIS GRACILIS.

Loris gracilis, Geoffr., Magas. Encycl. Ann. 4, i., p. 48 (1796);
 , id. Catal., p. 37, no. 1 (1803); id. Ann. Mus., xix., p. 163
 (1812); Is. Geoffr., Cat. Méth. Primates, p. 79 (1851);
 Blyth, Cat. Mamm. As. Soc., p. 19 (1863); Anderson,
 Cat. Mamm. Ind. Mus., p. 97 (1881); Blanf., Faun. Brit.
 Ind. Mamm., p. 47 (1888).

Nycticebus gracilis, Fischer, Syn. Mamm., p. 70 (1829); Schl.,
 Mus. Pays Bas, vii., p. 284 (1876).

Stenops tardigradus, Illiger, Prodr. Syst. Mamm., p. 73
 (1811, pt.).

Stenops gracilis, Van der Hoeven, Tijdschr., Nat. Ges., xi., p.
 39 (1844); Kelaart, Prod. Fauna Zeyl., p. 9 (1852).

Characters.—A slender-bodied animal covered with close, soft, and woolly fur. Head short and round; eyes very large; nose narrow and much pointed; ears small and haired externally; tips nude. Limbs long, remarkably slender and angularly bent; hands and feet covered with short hair; index-finger with three phalanges and finger-bones.

Skull with eye-sockets closely approximating, in the centre separated only by a thin plate of bone; nasal and premaxillary bones prolonged forward to support the narrow pointed nose; cranium, along its base to end of nasal bones, two inches long, broader across the orbits than behind in front of the articulation of lower jaw; bony palate extending back beyond the

posterior molar tooth. In the upper jaw the incisors are small and equal (Fig. 6) ; posterior pre-molar similar to, but smaller than the anterior molar ; anterior molar with the oblique ridge on crown well developed ; crown of posterior molar four-cusped, that of the posterior lower molar five-cusped. Dorsal and lumbar vertebræ together, 23 ; caudal vertebræ, 6-8.

The alimentary canal is four times the length of the body.

Adult.—Dingy grey above, darker on back, paler on lower back ; the hairs tipped with white. Sides of body, outside of fore- and hind-limbs dingy white, with a faint rufous wash on the outside of the hind-limbs. Face and ring round eyes dark greyish-brown ; streak along nose white, branching on forehead above the eyes on each side into a broad ring encircling the dark ocular ring ; this frontal branch sometimes absent. Under side greyish-white. Hairs of fur greyish-white at base, dark in the middle, and tipped with white. Length, 8 inches.

Young.—More rust-coloured than the adult.

Distribution.—The Slender Loris is common in the lower forests of Ceylon and of Southern India, south of the Godaverī river, as well as in those of the Eastern Ghats.

Habits.—This curious, emaciated-looking, little creature is nocturnal, living entirely in trees. It sleeps during the day rolled up in a ball, with its head between its legs, grasping its perch with its hands. According to Jerdon these animals are occasionally brought in large numbers to the Madras market, their eyes being a favourite remedy of the Tamil doctors for ophthalmic diseases.

In its movements it is slightly more active than the Slow-Loris. Its food consists of succulent leaves, honey, insects, birds' eggs, and small animals.

THE SLOW-LORIS. GENUS NYCTICEBUS.

Nycticebus, Geoffr., Ann. du Mus., xix., p. 162 (1812).

Stenops (nec Illiger), Van der Hoeven, Tijdsch. Nat. Ges., xi., p. 39 (1844).

Bradycebus, Cuv. et Geoffr., Mém. Class. Mamm. (1795).

This genus, like the last, is represented by a single species, and its characters, therefore, are detailed below.

I. THE JAVAN SLOW-LORIS. NYCTICEBUS TARDIGRADUS.

Lemur tardigradus, Linn., S. N., i., p. 44 (1766, pt.).

Nycticebus bengalensis, Geoffr., Ann. Mus., xix., p. 164 (1812).

Nycticebus javanicus, Geoffr., t. c. p. 164 (1812); id. Cat. Primates, p. 78 (1851); Schl., Mus. Pays Bas, vii., p. 286 (1876).

Nycticebus tardigradus, Fischer, Syn. Mamm., p. 71, no. 2 (1829); Is. Geoffr., Cat. Méth. Primates, p. 78 (1851); Blyth, Cat. Mam. As. Soc., p. 18 (1863); Schl., Mus. Pays Bas, vii., p. 285 (1876); Anderson, Cat. Mamm. Ind. Mus., p. 94 (1881); Blanf., Faun. Brit. Ind. Mamm., p. 44 (1888).

Stenops tardigradus, Van der Hoeven, Tijdschr. Nat. Ges., xi., p. 39 (1844); Wagner in Schreb., Säug. Suppl., v., p. 151 (1855).

Stenops javanicus, Van der Hoeven, *op. cit.*, p. 40 (1844); Wagner, *op. cit.*, p. 152 (1855).

Nycticebus cinereus, Milne-Edw., Ann. Mus., vii., p. 161 (1867); id. N. Arch. Mus., iii., p. 9, pl. 3 (1867); Anderson, Rep. Zool., Yun-nan, p. 103 (1879); Schl., Mus. Pays Bas, vii., p. 286 (1876).

Lemur menagensis, Nachtrieb, Zool. Anz., xv., p. 147 (1892).

(Plate III.)

Characters.—Body larger and fuller than in *Loris*, and covered

with close and woolly fur. Head short and round. Eyes large, set close together, and having a gentle expression; face short and flat; muzzle less projecting than in *Loris*; ears small, rounded, hairy, and nearly buried in the fur; neck short; tail invisible externally. Limbs short; index-finger small, containing three bones; toes remaining spontaneously contracted after death. Top of skull with prominent crests, globular behind; facial bones conspicuously projecting in front; orbits large, their inner margins separated from each other by a narrow flat space. Pre-maxillæ not produced far in front; hind border of bony palate not extending backwards beyond the median molar. Of the upper teeth, the inner incisor larger than the outer, one often absent on each side; canine vertically very long, with a gap between it and the anterior pre-molar; anterior pre-molar elongate, the posterior differing considerably from the anterior molar, and having a short cusped heel behind; posterior molar with a three-cusped crown. Teeth of lower jaw agreeing with those in the diagnosis of the family (*suprà*, p. 24). Vertebrae in dorsal and lumbar regions together 23 or 24. The long flexor muscle of the thumb, so characteristic of the Anthropoid Apes, is present in *Nycticebus*. The interlacement of the tendons of the muscles of its foot (according to Huxley and Murie) closely resembles the arrangement in the higher Primates. The long flexor muscle of the toes (*flexor longus digitorum*) is very large, and has one important origin on the lower end (internal condyle) of the thigh-bone correlated with the powerful grasp of its hind-limbs. The female bears one young at a birth.

Above, ashy-grey, rather paler below; more or less silvery on the back, often rufescent on the rump, with the hairs dark ashy at the roots; dorsal stripe from crown to loins chestnut



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THE JAVAN SLOW-LORIS.

brown; circle round the eyes dark brown; a white line down the nose between the eyes; oral patch, including the ears, brown.

The Slow-Loris varies greatly in size and colour in the different regions it inhabits, and its varieties have been recognised by many naturalists as distinct species.

Every shade of colour occurs among specimens from different habitats. The colour varies between rufescent grey, or greyish-rufous, or white (with a brown tinge showing through from below) and silvery grey. The dorsal stripe varies from rufous to dull grey or even black, expanding out, or not, on the crown of the head, arms, and cheeks, bifurcating to the orbital rings and ear-patches, or to one or other only. Sometimes the dorsal stripe and face-markings are wanting altogether. Under side varying from pale rufescent grey to light rufous or dull grey. Length of head and body varying from $12\frac{3}{4}$ to 16 inches.

“It is an interesting fact,” observes St. George Mivart, “that as far as concerns the skull and dentition, the Asiatic *Nycticebus* far more resembles the African *Perodicticus* than it does its Oriental neighbour *Loris*.”

Distribution.—The Slow-Loris has a comparatively wide and interrupted range. It is common in the dense mountain forests of Assam and Burma (where it has received the distinctive appellation of *N. bengalensis*), as well as in Tenasserim and the Malayan Peninsula. It has also been obtained in Siam and Cochin-China, whence it has been described as a distinct species (*N. cinereus*), from its silvery-grey fur; while it also occurs—somewhat reduced in size—and often (but not invariably) without the upper incisor teeth—in the islands of Sumatra, Java, and Borneo with its surrounding islet groups,

as well as in the Philippine Islands. The form from the last-named localities (figured on Plate III.) has generally been recognised as *N. javanicus*; but, from a careful examination of the material in the British Museum, it appears to the present writer that the specimens from all these localities merge so insensibly into each other that it is impossible to separate them into distinct species. The Slow-Loris, though occurring on the north-eastern frontier of India, has not yet been discovered in the Himalayas.

Habits.—Like the Slender Loris, the Slow-Loris is arboreal and nocturnal, hardly differing in its food and general habits from the latter. It lives alone or in pairs, and moves about very slowly, with its head curiously drawn up close to its body, with the latter arched and its limbs very angularly disposed. Colonel Tickell, has observed it, however, to raise itself on its hind-legs and throw itself upon an insect. It is generally silent, but can utter a low growl when angry. In captivity it becomes docile, but is never very long-lived. Tickell records that "it never by choice leaves the trees. . . . It climbs readily and grasps with great tenacity. If placed on the ground, it proceeds, if frightened, in a wavering kind of trot, the limbs placed at right angles. It sleeps rolled up in a ball, its head and hands buried between its thighs, and wakes up in the dusk of the evening to commence its nocturnal rambles." Another observer records: "When he climbs he first lays hold of the branch with one of his hands and then with the other. When he has obtained a firm hold with both hands, he moves one of his hind-paws, and after firmly grasping the branch with it, he moves the other. He never quits his hold with his hind-paws until he has obtained a secure grasp with his hands." The remarkable tenacity of grasp in its feet is largely due to the auto-

matic action of the flexor muscles of the toes (the digits continuing flexed even after death), and the mere extension of the leg largely contributes to the "effortless suspension of the body" (*Murie*), as in the Fruit-Bats and other species which hang passively by their hind-limbs. (*Huxley*.)

Dr. Coghlan, speaking of the Chinese race (*N. cinereus*), says: "They make a curious chattering noise when angry, and when pleased at night they utter a short though tuneful whistle of one unvaried note; this whistle is thought by Chinese sailors, who take them to sea, to denote the coming of wind. . . . Their intelligence seems to be much below that of the Monkey. . . . The Slow-Loris, when newly-born, is about four inches long, and covered with fur; it holds on by its four hands to the mother's fur, and in that attitude sucks the milk from its parent's breast."

THE GALAGOS. SUB-FAMILY II. GALAGINÆ.

The Lemurs comprised in the present Sub-family are divisible into two groups—those inhabiting the mainland of Africa and those confined to the island of Madagascar. The exclusively African species, the True Galagos, constitute the single genus *Galago*; while the Malagasy group is represented by three genera, the so-called Fat-tailed Lemurs (*Opolemur*), the Dwarf-Lemurs (*Microcebus*), and the Mouse-Lemurs (*Chirogale*). The members of this Sub-family vary considerably in size, and are all covered with soft woolly fur. Their ears especially are largely developed, being more or less membranaceous and naked, and their sense of hearing very acute. The eyes are large and the tail always elongated. In the skull the length of the muzzle is less than the greatest longitudinal diameter of the orbit (except in the genus *Galago*).

Their teeth number 36—18 above and 18 below—as in the bulk of the *Lemuridæ*; the upper molars present on their crown an oblique ridge from the outer hind cusp to the inner front cusp. The ankle region (*tarsus*) of the hind-limb is much elongated, through the lengthening of two of its bones (the *calcaneum* and *naviculare*): this feature occurring to a greater extent among the African than among the Malagasy species. The mammæ are four in number, two on the breast and two on the abdomen.

Many of the species hibernate during the dry winter season, and to enable them to survive, they accumulate during the summer months a thick deposit of fat over their bodies, more especially at the root of the tail, a fact first conspicuously observed in the *Opolemurids*. This fat is absorbed for their sustenance during their prolonged torpidity.

THE AFRICAN GALAGOS. GENUS GALAGO.

Galago, Geoffr., Mag. Encycl., Ann. 2, i., p. 49 (1796).

The African Galagos are generally larger in size than the Madagascar members of the group, and have the snout produced beyond the lower jaw. Their ears are large, membranaceous, and have a very mobile contractile hinder edge, the animal having the power of folding them up at will. The eyes are also large and approximated; the fingers and toes very long and slender, and the tail thick and bushy.

The skull presents a high, broad, and round brain-case, with a relatively short facial region. The pre-maxillary bones are very much reduced, so that the muzzle, measured from the anterior margin of the orbit forward, is shorter than the longitudinal diameter of the orbits. The bony palate is also relatively short. Compared with those of the Madagascar genera

the orbits are, according to Dr. Forsyth Major, much broader vertically and horizontally in the genus *Galago*. The squamosal region of the skull and the outer portion of the ear-capsules (the periotic) are large and inflated. The mandible (or lower jaw) has its lower hind edge, or angle, produced backward.

The dentition of the Galagos presents several important characters. In respect to their upper teeth, the incisors are small, equal, and have a hind cusp on the cingulum. A distinct gap exists between the canine and the pre-molar teeth. Of the pre-molars, the anterior one is canine-like, and is equally distant from the canine and its own next neighbour. To the outside it has one main cusp, and generally one minute supplementary cusp on each side. The median pre-molar shows three cusps, and one strong inner front cusp. The posterior pre-molar is always molar-like. It has one front supplementary and two main cusps to the outside; and one front and one supplementary hind cusp to the inside: it has also on the crown the oblique ridge spoken of above.

The molars have a deep concavity on their hind border, due to the development of the cingulum on the inner half only of that border of the tooth; to the outside they present two main cusps (and often supplementary minute fore and hind cusps); while to the inside they present two cusps, and also an intermediate cusp in front between the two fore cusps; the oblique ridge is also here present; the hindmost molar is three-cusped. The five hind molars are, therefore, nearly equal in size. In the lower jaw the pre-molars are complicated. The anterior and median are canine-like and procumbent, with a cusped heel behind; the posterior is distinguished from a molar only by the lesser size of its fore-part. The molars are also complicated; the anterior and median are equal in size

and four-cusped—the two front cusps (united by a ridge) are taller than the two hind ones, and there is a minute cusp between the two hind cusps. The posterior molar, though smaller than the others, is five-cusped. The oblique ridge is not present in the lower molars.

The brain of the Galagos is narrower and shallower than that in the *Lemurinæ*.

The female gives birth to two or three young at a time.

According to Dr. Forsyth Major, who has made the Lemuroidea a special study, the smaller African Galagos have departed less from the primitive Lemuroid type than the Madagascar genera, in which greater specialisation has taken place.

The members of the genus *Galago* are widely distributed on the African continent, but are unknown in Madagascar. They range throughout the dense forest regions, from Abyssinia in the north-east, to Senegambia in the west, and southward as far as Natal and Mozambique.

Almost all the Galagos are nocturnal. They are chiefly arboreal, and when they descend to the ground they advance by hops on their long hind-limbs. They feed chiefly on fruits, insects, birds, and birds' eggs.

I. GARNETT'S GALAGO. *GALAGO GARNETTI*.

Otolicnus garnettii, Ogilby, P. Z. S., 1838, p. 6.

Otolemur agisymbianus, Coquerel, Rev. et Mag. de Zool., 1859, p. 457.

Otogale garnettii, J. E. Gray, P. Z. S., 1863, p. 140.

Galago garnettii, Sclater, P. Z. S., 1864, p. 711, pl. xi.

Schlegel, Mus. Pays Bas, vii., p. 429 (1876).

Characters.—Head round; snout elongate, protruding over

the lower jaw ; ears very long, wide and rounded ; eyes large and approximated. Toes and fingers not united by a membrane. Posterior upper molar with its fourth cusp little developed ; the posterior lower molar four-cusped.

Fur woolly, the basal part of the hair Mouse-grey, the tips dull yellowish-white. Ears greyish-black ; face from the middle of crown along the nose and round the eyes greyish-white. Top of head and neck dark pepper-grey ; rest of upper side yellowish-grey, with longer black hairs distributed over the body ; outside of arms and legs washed faintly with faded rufous. Under side and inner side of arms and legs greyish-white. Tail brownish-red at base, darker at tip. Length, 8 inches ; tail, $8\frac{3}{4}$ inches.

Distribution.—East coast of Africa.

Habits.—Garnett's Galago is essentially nocturnal in its habits, feeding on fruits. According to Mr. Bartlett, it exhibited in confinement no fear of Cats or Dogs, and was very sprightly and tricky. It kills all it can pounce upon and overpower. On the ground it jumps upright, like a Kangaroo, on its hind-limbs, without using its fore feet, covering several feet at a spring.

II. THE SENEGAL GALAGO. GALAGO SENEGALENSIS.

Galago du Sénégal, Geoffr., Mag. Encycl. Ann. 4^e, p. 1 (1796).

Galago senegalensis, Geoffr., Ann. Mus., xix., p. 166 (1812) ;

Is. Geoffr., Cat. Méth. Primates, p. 81 (1851) ; Schlegel, Mus. Pays Bas, vii., p. 329 (1876).

Galagoides senegalensis, Smith, S. Afr. Q. Journ., ii., pt. 1, p. 32 (1833).

Galago moholi, Smith, Ill. Zool. S. Afr. Mamm., pls. 8, 8 *bis* (1839) ; Gray, P. Z. S., 1863, p. 147.

Otolicnus galago, Wagner in Schreber's Säug. Suppl., i., p. 292 (1840); Van der Hoeven, Tijdschr. Nat. Ges., xi., p. 41 (1844).

Otolicnus senegalensis, Peters, Reis Mozamb. Säug., p. 11 (1852).

Galago senaariensis, J. E. Gray, P. Z. S., 1863, p. 147, Mivart, P. Z. S., 1864, p. 647.

Galago (Otolicnus) moholi, Mivart, P. Z. S., 1864, p. 647.

Characters.—Body slender; head broad and sub-globular; nose high and pointed; ears large, bare, and with narrow rounded tips; hind-limbs longer than the fore-; tail with longer hair at tip. Fur very thick and soft on body and tail. Upper side pinkish-grey, or faded white with a slight wash of pink; back, sides of body, and outer surface of limbs pearly to yellowish-white; sometimes a dark ring round the eyes; a streak down the nose white or yellowish-white; ears flesh-coloured, sprinkled with pure white down; head, face, whole of under sides and inner sides of limbs white, yellowish, or whitish-buff; tail yellowish or reddish brown, darker at tip, lighter beneath; upper surface of hands and feet white, washed with yellow. Length of body, 7–8½ inches; tail of about the same length. The male and female are of the same size and of the same colour, but the male is somewhat more washed with yellow. Muzzle shorter than the diameter of the eye-socket; the bony palate not extending past the hinder end of the median molar. Anterior and median upper molars slightly larger than the posterior pre-molar; the latter as well as the two anterior molars with a small cusp between the two front cusps.

Distribution.—This beautiful little Lemur was first recorded from Senegal, in West Africa. It occurs, however, from about 25° S. lat. in South Africa northwards to Tete on the Zambesi,

through the mountainous regions of East Africa, on the shores of Lake Nyasa, to as far north as Senaar.

Habits.—The Senegal Galago is nocturnal and arboreal, occurring in the forests singly or in pairs. It makes a nest of leaves in the fork of a tree, and during its diurnal rest it either retreats thither, or composes itself on a branch, unwilling to move, and staring at passers-by, with its tail invariably folded across its body and round its neck. After sunset; these Galagos become lively, and in their movements they evince great activity; they spring from branch to branch, and even from tree to tree, with extraordinary facility (as both Sir Andrew Smith and Sir John Kirk have recorded), often clearing at single leaps distances of six feet. When seen in the dim light they may easily be taken for Bats. “They always seize with one of their fore feet the branch upon which they intend to rest. In their manners they manifest considerable resemblance to Monkeys, particularly in their propensity to the practice of ridiculous grimaces.” (*Sir A. Smith.*) In this habit they resemble also some species of the genus Lemur. Their food consists chiefly of fruits and of insects. The female produces generally two young at a birth.

III. ALLEN'S GALAGO. GALAGO ALLENI.

Galago allenii, Waterh., P. Z. S., 1837, p. 87; Sclater, P. Z. S., 1863, p. 375, pl. xxxii.

Galago allenii, var. *gabonensis*, Gray, P. Z. S., 1863, p. 146.

Galago gabonensis, Mivart, P. Z. S., 1864, p. 630.

Galago (Otolicnus) allenii, Mivart, P. Z. S., 1864, p. 647.

Otogale pallida, Gray, P. Z. S., 1863, p. 140, pl. xix.

Otolicnus apicalis, du Chaillu, Equat. Africa, App., p. 471.

Galago elegantulus, Slack, Proc. Ac. Sc. Phil., 1861, p. 153.

(Plate IV.)

Characters.—Head round ; muzzle pointed ; eyes very large ; ears also very large, long, nude, and membranaceous ; fingers and toes very long, slender, and fine. Tail thick, round, and longer than the body ; ankle-bones elongated. Length of body, $8\frac{1}{4}$ inches ; tail, 10 inches. Head brownish-grey ; a narrow black ring round the eyes ; a streak from the forehead down the nose whitish ; back greyish-brown, washed (sometimes markedly) with rufous on the upper back, fading out towards the root of the tail ; the latter black or greyish-black. Outside of arms and legs washed with rufous, sometimes with a white spot on the shoulder-joint and over the groin ; posterior aspect of legs sooty-black ; cheeks, sides of nose, entire under surface, and inner side of limbs creamy-white with a rufous-washed bar across the chest. Muzzle shorter than the diameter of eye-socket. Incisors seen from the side, more or less hidden by the canines ; anterior upper pre-molar very canine-like, relatively much produced longitudinally, with an interval between the anterior and median pre-molars ; posterior upper pre-molar four-cusped, and with an intermediate cusp on the oblique ridge ; posterior upper molar almost equal in size to the median one.

Distribution.—This species has been recorded from the Gaboon, in West Africa, and from Fernando Po, whence it was first obtained by Captain Allen, R.N., in 1837.

Habits.—Although little or nothing has been recorded of its habits, it is unlikely that they differ much from those of the species already known.

IV. DEMIDOFF'S GALAGO. GALAGO DEMIDOFFI.

Galago demidoffi, Fischer, Act. Soc. des Nat. Mosc., i., p. 24, f. 1 (1806) ; Peters, P. Z. S., 1863, p. 380, pl. xxxv. ; Mivart, P. Z. S., 1864, p. 648.



ALLEN'S GALAGO.

Otolicnus peli, Temm., Esquis. Zool. Mamm., p. 42 (1853).

Otolicnus demidoffi, Wagner in Schreb., Säugeth. Suppl., v., p. 160 (1855).

Hemigalago demidoffi, Dahlb., Stud. Zool., p. 230 (1856).

Galago murinus, Murray, Edinb. Phil. Journ. (n.s.), x., pp. 243-251, pl. 11 (1859).

Characters.—Head round ; body short and thick : snout very narrow ; long bristles on the face, corners of the eyes, and sides of the nose ; ears long, oval, membranaceous, transparent, the inner margin haired ; eyes large and projecting ; nose elongated in front, and projecting above the upper lip ; fingers slender ; wrist, ankle, hands and feet short-haired ; digits naked ; tail longer than body, round and slender. Length, 5 inches ; tail, 8 inches.

Basal part of hair Mouse-grey. Upper side reddish-brown, more rufous down the back, and on the tail, except its distal half, which is darker. Top of head and sides of face darker ; a narrow white streak from the brow down the nose ; ring round the eyes dark, wider on the inner side ; chin, throat, inner side of limbs, and under surface of body creamy-white. In the young, which remains blind for several days after birth, the white nose-streak is less defined, and the fur is shorter and lighter than that of the parents.

Orbits approximating ; front bones of jaw (the pre-maxillæ) projecting beyond the incisors ; upper median pre-molar teeth with enlarged heel, and with one or two diminutive cusps ; upper molars with a small cusp on the oblique ridge ; wrist-bones elongated.

Distribution.—Demidoff's Galago occurs in Senegal, in West Africa, and has been obtained in Central Africa in the Niam-

Niam country by Dr. Schweinfurth, and in the Monbuttu country by the late Emin Pasha.

Habits.—Writing of Demidoff's Galago in a letter from Africa addressed to Mr. A. Murray, Mr. Thomson says: "It was a most interesting and amusing pet, not only quite tame, but manifesting strong attachment. It was a very epitome of zoology, of the size and colour of a large Rat; it had the tail of a Squirrel, the facial outline of the Fox, the membranous ears of the Bat, the eyes and somewhat of the manners of the Owl in its cool odd way of peering at objects, the long slender fingers of a lean old man who habitually eats down his nails, and all the mirthfulness and agility of a diminutive Monkey. It hated its cage at night, but delighted to leap among the bars of the chairs ranged purposely round the table for it. It could clear a horizontal distance of at least six feet at a bound. . . . It possessed a curious power of folding its membranous ears back upon themselves and somewhat corrugating them at pleasure; and it appeared to me that the palms of its hands and feet were endowed in some degree with the power of suction. . . . I have seen it maintain itself in positions where the mere lateral pressure of its limbs appeared to be inadequate for the purpose. . . . I never saw it muster courage enough to attack either a Grasshopper or a Mantis." . . .

V. MONTEIRO'S GALAGO. GALAGO MONTEIRI.

Galago monteiri, Bartlett, P. Z. S., 1863, p. 231, pl. xxviii.

Callotus monteiri, Gray, P. Z. S., 1863, p. 145.

Characters.—Fur Mouse-grey at base, with white tips; pupils of eyes oval and vertical; ears very large and naked; hairs on face and cheeks short; feet broad, short, and strong; toes

broad, with rounded discs ; thumb very broad ; tail very long. Entirely pale grey over the head, face, cheeks, body, and tail ; throat nearly white ; hands and feet dark brown, nearly black ; nose black ; ears nearly black. One of the largest species of the Sub-family. Length, 12 inches ; tail, 16 inches long.

Distribution.—This species was discovered by Mr. Monteiro in Cuio Bay on the West Coast of Africa, to the south of Loanda ; and the late Captain Cameron, R.N., brought a few specimens home with him from Bailunda, on his return from his celebrated march across the Continent.

Habits.—Little is known of this species from observation in the field. A few specimens have reached Europe, and on one that lived in the Zoological Gardens in London, Mr. Bartlett made the following observation: "The animal has the power of turning its ears back by the complex muscles of their external aspect, and folding them up when at rest. When moving about or in search of food they spread out and stand upward and forward, reminding one of those of the Aye-Aye ; but when folded back and down, the animal's face bears a strong resemblance to the Douroucouli (*Nyctipithecus*)."

VI. THE GREAT GALAGO. GALAGO CRASSICAUDATA.

Galago crassicaudatus, Geoffr., Ann. Mus., xix., p. 166 (1812).

Otolicnus crassicaudatus, Peters, Reis, Mossamb. Säugeth., t.

2, t. 4, figs. 1-5.

Otogale crassicaudata, var. *kirkii*, Gray, P. Z. S., 1864, p. 456.

? *Galago lasiotis*, Peters, S. B. Ges., Nat. Fr. Berl., 1892, p.

224.

Characters.—Hair long and woolly. Head round ; muzzle more elongated than in other Galagos ; nose-pad with a deep

furrow ; eyes large ; ears large, the upper half membranaceous and nude ; tail long, thick and bushy ; fourth digit of hand and foot longest ; fingers and toes not united by a membrane, but with flat disc-like terminations.

Hair Mouse-grey at base, silver-grey at tips ; the hair on the belly white tipped, sometimes entirely white ; hairs on back longer and with black tips. General colour yellowish-brown, with a lighter band from the forehead along the centre of the nose and round the eye-circles, which are darker. Iris reddish-brown. Top of head rusty-brown ; back grey ; sides of body, cheeks, and outer side of limbs grey, faintly washed with rusty-red ; whole under side grey or yellowish-white. Tail ferruginous ; hands and feet deep rufous-brown ; short hairs of digits blackish-brown. Length, 13 inches ; tail, 16 inches. The female has the pelage similar to that of the male.

The coast form, which has been described as Kirk's Galago (*G. kirkii*), is only a variety of the present species. In it the fur is pale ashy-grey ; the hairs at the base Mouse-grey, tipped with grey, with longer black hairs distributed over the body ; cheeks, inner sides of limbs, and under side greyish-white ; face, crown, and nape washed with reddish-brown, which extends on the outer side of the limbs ; lower back more lightly washed ; tail, dirty grey.

Distribution.—The Great Galago is found on the south-east coast of Africa to 24° S lat., and extends into the interior for about 140 miles from Quillimane. Kirk's Galago (*G. crassicaudata*, var. *kirkii*) is confined to the maritime regions and mangrove forests of the east coast. Sir John Kirk states that it has been observed at the Luabo mouth of the Zambesi, at Quillimane, and at Mozambique. It has also been procured at Taveita.

Habits.—This species, named by the Portuguese “Rat of the Cocoanut Palm,” nestles by day among the palm fronds, its ears folded up like a Beetle’s wing, and, if disturbed, it performs feats of agility, darting from one palm to another. “It will spring with great rapidity,” says Sir John Kirk, “adhering to any object as if it were a lump of wet clay. It has one failing,—should a pot of palm-wine be left on the top of the tree the creature drinks to excess, comes down and rushes about intoxicated,” and can then be easily caught. “It becomes active just after darkness sets in. The rapidity and length of its leaps, which were absolutely noiseless, must give great facilities to its capturing live prey. I never knew it give a loud call, but it would often make a low chattering noise.”

THE MOUSE-LEMURS. GENUS CHIROGALE.

Cheirogaleus, Geoffr., Ann. du Mus., xix., p. 171 (1812).

Chirogale, Forsyth Major, Nov. Zool., i., p. 1 (1894).

In this genus are included a group of Lemurs of very small dimensions, and of which the following are the more important characters: The rounded head has a short face covered with fur. The eyes are very large and set close together, agreeing well with their nocturnal life. The ears are conspicuous, projecting beyond the fur, thin, and membranaceous. The hind-limbs are larger than the fore-, the foot being remarkably elongated by the lengthening of the heel-bone (*Astragalus*). The nail of the second finger is pointed, but all the rest are flat. The length of the tail exceeds that of the body. In some the orbits are directed outwards instead of directly forwards as is generally the case among the members of the Sub-order. Of the teeth in the upper jaw, the inner incisors are larger than the outer; the anterior pre-molar is as long

vertically as its median neighbour ; while the posterior, which is smaller than the anterior molar, has one internal and one large external cusp. Of the molars, the inner hind cusp is either small or wanting. The bony palate is long, its hind margin extending behind the posterior molar. The pre-maxillary bones, carrying the incisor teeth, are largely developed. The mastoid portion of the ear-capsules (periotic) is not inflated as in many species of Lemurs. Several of the species of this genus remain somnolent and torpid throughout the dry season, in regions where it is then impossible to obtain the vegetable food they require. The Mouse-Lemurs are confined to the island of Madagascar.

I. MILIUS' MOUSE-LEMUR. CHIROGALE MILII.

Cheirogaleus milii, Geoffr., Cours de l'Hist. Nat., Mamm., ii^e. leçon, p. 24 (1829).

Cheirogaleus typicus, A. Smith, S. Afr. Q. Journ., ii., p. 56 (1833)

Chirogale milii, Forsyth Major, Nov. Zool., vol. i., p. 21 (1894), Taf. ii., figs. 1, 8, 9 (with full synonymy).

Characters.—Snout pointed ; eyes prominent ; ears moderately large, oval, membranaceous, and sparsely-haired externally ; tail Rat-like, thick at base, becoming thinner towards its extremity. Brain-case of skull less vaulted than in the true Lemurs. Bony palate prolonged behind the posterior molar, its hind perforations large ; mastoid portion of ear-capsule (periotic) not swollen. No gap in upper jaw between the canines and anterior pre-molar teeth ; anterior upper pre-molar canine-like, and longer than the median ; no gap between the anterior and median pre-molars ; posterior lower molar reduced in size. The anterior milk pre-molar changes first, the posterior next, and median last. The posterior upper milk-

molar has one inner and two outer cusps. (*Forsyth Major.*) Heel-bone elongated.

General colour varying considerably; top of head, neck, and upper part of back, brownish-grey or uniform delicate fawn-brown, sometimes "grizzled with silvery-grey" or washed with rufous, more especially on the head; rest of back, sides, outer sides of limbs and tail ashy-brown; under side and inner side of limbs greyish-white, or white slightly washed with yellowish. Ring round orbits and side of nose, black; space between the eyes lighter than the back of the head. Length, 7-8 inches. The young are dark Mouse-grey.

Distribution.—Milius' Mouse-Lemur, though a rare species, is widely distributed in Madagascar, being found in the Ankey Forest on the north-east coast as well as along the west coast as far south as Mouroundava.

Habits.—This beautiful little Lemur, no bigger than a Guinea-pig, is, like most of the other species of its group, nocturnal and arboreal, feeding on fruits and probably honey. It runs on all fours, but sits up to eat, holding its food in its hands. In the winter months it is believed to hibernate in hollow trees. Having scooped out a cavity big enough to contain its body, the little animal collects, according to the Rev. G. A. Shaw, sufficient loose leaves and grass to cover it; it then retires, and, burying itself in the heap, is sustained during its period of hibernation by the store of fat which, during the summer months, becomes deposited at the root of the tail, and swells the latter out to an enormous size.

II. THE BLACK-EARED MOUSE-LEMUR. *CHIROGALE MELANOTIS*.

Cheirogaleus typicus (nec Smith), Gray, Cat. Monkeys, Brit.

Mus. App., p. 133 (1870); id. P. Z. S., 1872, p. 855 (partim), pl. lxxi., fig. 3.

Chirogale melanotis, Forsyth Major, Nov. Zool., vol. i., p. 25,
Tab. ii., fig. 10 (1894).

(Plate V.)

Characters.—Very similar to *C. milii*, but distinguished by the far less woolly and more silky fur; face pointed; ears rounded, somewhat large, the outside and half the inside haired; lips flesh-colour. Upper side rather light brownish (almost reddish) grey; upper side of tail darker; tips of hair silvery, but less so than in *C. milii*. No white stripe between the eyes as in that species, the space not lighter than the top of the head and back; ears very dark brown; a dark brown ring round the eyes; a white stripe along the side of the neck. Under side of body and inner side of limbs greyish-white. Length, $10\frac{1}{2}$ inches; tail, 9 inches. Skull smaller in all its dimensions than *C. milii*; the face longer and more tapering; the nasal bones broader before and behind; the posterior perforations in the palate large, as in *C. milii*; mandible less spread; the inner cusp of the anterior upper pre-molar less developed; basal heel of upper and lower canines stronger; posterior lower molar longer and with a distinct heel.

Distribution.—This species is known from a single skin in the collection of the British Museum, which was obtained at Vohima, on the north-east coast of Madagascar.

III. THE HAIRY-EARED MOUSE-LEMUR. CHIROGALE TRICHOTIS.

Chirogaleus trichotis, Günther, P. Z. S., 1875, p. 78, pl. xv.

Chirogale trichotis, Forsyth Major, Nov. Zool., vol. i., p. 26
(1894).

Characters.—Brownish-grey above; lower parts grey with the hairs white-tipped; a spot in front of the eye black; the lips



THE BLACK-EARED MOUSE-LEMUR.

and a line down the nose, white. Hands and feet grey, the hairs white-tipped. Ears short, concealed in fur, with tufts of long hair on the lower part and on the space in front of the ears. Tail shorter than the body, its hair short except forwards, where it is longer.

Skull depressed and flattened ; cranial portion short.

Distribution.—The only known specimen of this species is the type in the British Museum, obtained by Crossley during his journey from Tamatave to Mouroundava.

IV. CROSSLEY'S MOUSE-LEMUR. *CHIROGALE CROSSLEYI*.

Chirogaleus crossleyi, Grandid., Rev. et Mag. de Zool., xxii., p. 49 (1870).

Characters.—Smaller than *C. melanotis* (Major) ; tail short and very hairy. Head very large, rounded ; ears small and haired. Hind-limbs longer than fore. Upper side, especially the head, rufous ; under side greyish-white. Round the eyes a black ring ; inner aspect of the ears dark brown, the upper border black. (*Grandidier*.)

Length, 8 inches ; tail, $4\frac{3}{4}$ inches.

Distribution.—Crossley's Mouse-Lemur is known as yet only from the forests to the east of Antsianak, in Madagascar.

Habits.—The two species last described (*Chirogale trichotis* and *C. crossleyi*) are very closely related together. They are nocturnal animals, and very rare ; consequently but little is known of their habits. It is, however, very improbable that they depart widely from those of the better known Mouse-Lemurs.

THE DWARF-LEMURS. GENUS MICROCEBUS.

Microcebus, Geoffr., Cours de l'Hist. Nat., Mamm., leçon vi., p. 24 (1828).

Under this genus are arranged five species of very small Lemurs, whose hind-limbs are longer than their fore-, though less so in proportion than is the case among the African Galagos. Their snout is also shorter ; their eyes are large, approximated together, very prominent and very bright, and their ears are elongated. On the ventral surface are situated four mammæ, two on the breast and two on the abdomen.

Of their bony framework, the brain-case is high, broad, and more vaulted than that of either the Mouse-Lemurs or the species of the next genus, *Opolemur*. The facial region is also shorter. The mastoid portion of the ear-capsules (periotic bones) and the squamosal region is somewhat less inflated than in *Galago*. With regard to their dentition, the inner upper incisor is larger than its outer fellow. Between the upper canine and the anterior pre-molar of its own side there exists no gap, nor is there a space between the anterior and the median upper pre-molars. The molars have three-cusped crowns, but these cusps are very sharp, and are weaker than those in *Galago*; the intermediate cusp between the two main cusps to the front is wanting. The concavity also of the hinder margin (so marked in *Galago*) is here very slight, but the basal ring (*cingulum*) is swollen internally to form an inner hind cusp. The posterior upper molar is smaller than the anterior, and its inner hind cusp is rudimentary. The hind border of the bony palate extends to behind the last molar tooth, its posterior perforations being very large. The angle of the lower jaw is not produced downwards.

The foot in the Dwarf-Lemurs is long, on account of the elongation of two of its ankle-bones (the *cuboid* and the *navicularæ*).

The species of this genus are confined to the island of Madagascar. They are entirely nocturnal, as their large eyes and inflated ear-capsules might suggest. They are chiefly arboreal and frugivorous.

I. SMALL DWARF-LEMUR. MICROCEBUS MINOR.

Microcebus murinus, Martin, P. Z. S., 1835, pp. 125.

Galago minor, Gray, Ann. and Mag. N. H., x., p. 255 (1842).

? *Chirogalus gliroides*, Grandid., C. R., 14 Dec., 1868.

Chirogaleus pusillus, Flower and Lydekker, Mammalia, p. 690 (1891 partim).

Microcebus minor, Forsyth Major, Nov. Zool., vol. i., p. 8 (1894), Taf. i., fig. 2; ii., figs. 5-7, 14, 15 (with full synonymy).

Characters.—Head rounded; muzzle short and pointed; eyes large and brilliant; ears large and naked; tail longer than body. Length of body, 5 inches; of tail, 6 inches.

Upper side, either for the most part Mouse-grey, washed with light rufous-brown, with the stripe down the back more or less distinct and somewhat darker; or with the rufous-brown colour preponderating. In grey specimens the upper side of the tail is washed with rufous, the under side being somewhat lighter. Cheeks, throat, breast, belly, and inner side of limbs almost pure white, here and there washed with grey. Between the eyes a white stripe; over the eyes in grey specimens a rusty-brown spot. Base of the hairs slate-grey; the tips silvery. (*Forsyth Major*.) Skull variable; the brain-case short and high, or long and depressed; the facial region short; posterior

upper pre-molar less than the anterior molar. Length of intestine, 20 inches; cæcum blunt, $1\frac{3}{4}$ inches long; main arteries of fore- and hind-limbs not broken up into a *rete mirabile* of small parallel vessels.

Distribution.—This beautiful little animal, sometimes called the “Rat” of Madagascar, the smallest of all the Lemurs, is known from Ambulisatra on the south-west coast of Madagascar, and from Fort Dauphin on the south-east coast.

II. THE DORMOUSE DWARF-LEMUR. *MICROCEBUS MYOXINUS*.

Microcebus myoxinus, Peters, Reis, Mossamb. Zool., i., Säugeth., pp. 14–20, Taf. iii. and iv. (1852); Forsyth Major, Nov. Zool., vol. i., p. 11 (1894).

Characters.—Head Cat-like and round; muzzle pointed and broader than in *M. minor*. Ears large, one-third shorter than the head and short-haired; eyes large and round. Fourth digit of hand longest; second and fifth shortest. Tail longer than the body, its hair stronger and shorter than on the body, but longer at the tip and on the upper side than it is beneath. Two pairs of teats, one pair on the breast, and one pair on the abdomen.

Resembles *M. minor*, but is redder in colour. Back reddish-yellow, washed with ferruginous, brighter on the forehead and under the eyes; a dark brown spot on the upper and lower corners of the eyes; sides of body between the limbs, hands and wrists, feet and ankles, as well as the external margins of the limbs, and the whole under side, as well as a spot on the brow, a line down the centre of the nose, and the sides of the head and cheeks, pure white, washed with yellowish-brown.

Tail golden-yellow, washed with ferruginous on the upper side, the entire distal third darker ; rest of the under side of the tail paler. Naked part of ears flesh-colour. (*Peters.*) Hairs slate-grey at base, the tips ferruginous.

Mastoid portion of ear-capsules (periotic-bones) not so inflated as in *M. minor*; hind border of bony palate extending to the posterior border of the last molar, its posterior foramina being large; pre-maxillary bones very large and projecting beyond the incisor teeth; angle of lower jaw pointed and hooked. Upper inner incisors standing in front of the canines, and nearly twice the size of the outer; no gap between the canines and the anterior pre-molar; the pre-molars vertically sub-equal, and with one external cusp; molars with two external cusps, the hinder of the two united to the large inner front cusp by an oblique ridge, their inner side bounded by the cingulum; the posterior molar smaller than the two anterior. Anterior and median lower molars four-cusped; the posterior, the largest of the cheek-teeth, five-cusped.

Distribution.—The Dormouse Dwarf-Lemur inhabits the south-west coast of Madagascar; it has also been obtained at Bambotoka in St. Augustin's Bay on the west coast.

III. SMITH'S DWARF-LEMUR. *MICROCEBUS SMITHI*.

Microcebus pusillus, G. R. Waterh., Cat. Mamm. Mus. Zool. Soc., 2nd ed., p. 12 (1838).

Cheirogaleus smithii, J. E. Gray, Ann. Mag. Nat. Hist., 1842, p. 257.

Chirogaleus pusillus, Flower and Lydekker, Introd. Mamm., p. 690 (1891, pt.)

Microcebus smithii, Mivart, P. Z. S., 1864, p. 641; Forsyth Major, Nov. Zool., vol. 1., p. 12; Taf. ii., figs. 3, 4, 12, and 13 (1894) (with full synonymy).

(Plate VI.)

Characters.—Closely related to the foregoing; the fur in most specimens less woolly than in the other species; eyes large; snout longer and more pointed; ears shorter, less than half the length of the head; ankles proportionally shorter; fingers and toes longer; fur generally darker, the tail not markedly different from the back, very Rat-like in form; the dark marks in front of the eye extending to the tip of the nose; inside of the ears more ferruginous; size about that of a Rat. Muzzle longer and more pointed than in *M. myoxinus*; pre-maxillæ more produced in front, and nasals more produced above the nostrils; bony palate less prolonged backwards beyond the posterior molar, the hind perforations of the latter large; the line of union of the two halves of the lower jaw shorter than in *M. myoxinus*; upper incisors set anterior to the canines, and distant from the inner margin of the pre-maxillæ, the inner pair larger than the outer pair; the anterior upper pre-molar less vertically extended than the median one; median and posterior lower molars having the hind outer cusp lower and longer than the front outer cusp.

Distribution.—Smith's Dwarf-Lemur is known from Fort Dauphin, on the south-east coast, from Betsileo in the centre, and from the south coast of Madagascar.

Habits.—Of the habits of both this and of the preceding species little is known, for they have rarely, if ever, been seen alive by Europeans. According to the Rev. G. A. Shaw, the present species lives in the belt of forest-land stretching from



SMITH'S DWARF-LEMUR.

the eastern forest into the heart of Betsileo, a few miles north of Fianarantsoa, where they are tolerably abundant, frequenting the tops of the highest trees. Among these it moves about on all fours (its very stout limbs having beautifully perfect hands), using its tail as a balance by twisting it round a branch. The tail is, however, not truly prehensile, the animal only employing it to steady itself, or to hold on slightly by. This species, whose food consists chiefly of fruit and insects, builds a nest in a fork amid the smallest branches near the top of some very high tree, the female bringing forth two and sometimes three young at a birth.

IV. THE FORK-MARKED DWARF-LEMUR. *MICROCEBUS FURCIFER*.

Lemur furcifer, Blainv., Ostéogr. Mamm., 1841, p. 35, pl. vii.

Cheirogaleus furcifer, Isid. Geoffr., C. R., xxxi., p. 876 (1850);

Mivart, P. Z. S., 1867, pp. 960-975 (skull and tarsus figured).

Lepilemur furcifer, Gray, P. Z. S., 1863, p. 145.

Phaner furcifer, J. E. Gray, Cat. Monkeys, Brit. Mus. App., pp. 132, 135 (1870).

Microcebus furcifer, Forsyth Major, Nov. Zool., vol. i., p. 16 (1894).

Characters.—Ears large and long; snout pointed; tail longer than the body, and equally haired; foot elongate. General colour reddish-grey. Unmistakably recognisable by the black dorsal streak bifurcating on the forehead into two branches, extending on the inner side of the ears and terminating over each eye.

Facial portion of skull longer than cranial; angle of lower jaw much produced backwards and downwards; hind margin of palate extending back to hinder margin of posterior molar; hind perforations of palate large; border of maxillary swollen

in the canines and pre-molars. Upper anterior incisors much larger than the posterior, and both anterior to canines; anterior pre-molars canine-like, both vertically and proportionately longer than the median pre-molars of any other species of the family; median pre-molar compressed, with a fore and hind heel; the posterior pre-molar with a large internal talon. Molars comparatively small, but longer and narrower than in *M. coquereli*; anterior molar much larger than the posterior pre-molar, its hind inner cusp rudimentary; the posterior molar longer than the posterior pre-molar, and smaller than the other molars, its inner cusp wanting. Lower anterior pre-molar lance-shaped, vertically longer than the two posterior sub-equal grinders; molars sub-equal, much larger than the posterior pre-molar; posterior molar comparatively short, five-cusped.

Distribution.—Chiefly found on the west coast of Madagascar.

V. COQUEREL'S DWARF-LEMUR. *MICROCEBUS COQUERELI*.

Cheirogalus coquereli, Grandid., Rev. Mag. de Zool., xix., 1867, p. 85.

Microcebus coquereli, Mivart, P. Z. S., 1867, pp. 966–967; Forsyth Major, Nov. Zool., vol. i., p. 14 (1894; with full synonymy).

Mirza coquerelii, J. E. Gray, Cat. Monkeys, Brit. Mus. App., pp. 131, 135, 136 (1870); Schlegel, Mus. Pays Bas, vii., p. 321 (1876).

Characters.—Similar to *M. furcifer*, but slightly smaller; ears large, long, and almost naked; tail longer than the body; fur soft and woolly. Above dark grey, washed with rufous; tail, at base, of the same colour as the back; remainder of tail dark rufous; throat, breast, and under side of body yellowish-grey.

Length of body, $8\frac{1}{2}$ inches ; tail, 13 inches ; skull high and arched ; outer and hinder portion of ear-capsules (periotic-bones) and squamosal swollen ; frontal bone longer than in *Opolemur* and *Chirogale* ; occiput less sloping from behind and above forwards and outwards. Upper median and posterior molars with one inner and two outer cusps, united by a curved ridge, cingulate all round, and with a small cusp or cingulum at the hind inner angle ; posterior pre-molars smaller and shorter than the molars, with strong and vertically longer outer cusp, and a much more feeble inner cusp ; posterior lower molar lengthened behind by a fifth cusp.

Distribution.—Coquerel's Dwarf-Lemur, or the "Sisiba," as the natives call it, is found round Passandava Bay, near Mouroundava, on the south-west coast of Madagascar.

Habits.—The Sisiba, like its congeners, is nocturnal and arboreal, constructing in the trees a nest of twigs. It feeds on fruits and leaves.

THE FAT-TAILED LEMURS. GENUS OPOLEMUR.

Opolemur, J. E. Gray, P. Z. S., 1872, p. 853.

The term *Opolemur*, by which this genus is designated, is not altogether appropriate, and is, indeed, even somewhat misleading. It was applied in the first instance to the typical species on account of the thickened base of its tail, which in the type-specimen was a very conspicuous character. The deposit of fat by which this thickening was caused was not then known to be merely transitory—a store of food collected at the base of the tail and on other parts of the body, to supply the needs of the animal during the arid and foodless season, when it retires into a state of torpidity. It is now known that

other species of this sub-family (as we have seen above in the case of the Mouse-Lemurs), which are generically distinct from *Opolemur*, share this peculiarity.

The two species included in this genus are intermediate between the Mouse-Lemurs and the Dwarf-Lemurs, and are really more nearly related to the former than to the latter. The skull is flat and depressed as in *Chirogale*, and the brain-case small and almost vertical behind. The posterior foramina in the palate are small. In respect to their dentition, the cusps of the upper molars are blunter and shorter than in the Mouse-Lemurs, but less so than among the Dwarf-Lemurs; the hind inner cusps of the anterior and median molars are large, and the ridge from the inner cusp is less intimately joined to the two outer cusps than in the Dwarf-Lemurs.

I. SAMAT'S FAT-TAILED LEMUR. *OPOLEMUR SAMATI*.

Chirogalus samatii, Grandid., Rev. et Mag. de Zool., xx., p. 49 (1868).

Opolemur milii, Gray, P. Z. S., 1872, pp. 853-4, pl. lxx., fig. i. (in part).

Opolemur samati, Forsyth Major, Nov. Zool., vol. i., p. 18 (1894).

Characters.—Head, Cat-like; hair on body and tail very short, longer at tip of tail; tail very thick at base, from accumulation of fat, especially in the month of August. Length, $7\frac{1}{2}$ inches; tail, $6\frac{1}{2}$.

Fur above dark grey, washed with ferruginous, the tips of the hairs silvery-grey; tail faded rufous; a white spot on the forehead, becoming a line down the centre of the nose; a black circle round the eyes; ears slightly longer; tail shorter

and thicker proportionately than in *Chirogale milii*; under surface and inner side of limbs fulvous.

Distribution.—This species, according to M. Grandidier, to whom all our knowledge of it is due, has been obtained on the River Tsidsibon, but is reported from other places on the west coast of Madagascar.

II. THOMAS' FAT-TAILED LEMUR. OPOLEMUR THOMASI.

Opolemur thomasi, Forsyth Major, Nov. Zool., vol. i., p. 20, Taf. i., fig. 1 Taf., ii., figs. 2 and 11 (1894).

Characters.—Nearly allied to *O. samati*. Head broad, flat; snout short; ears short. Above grey, with a wash of rusty brown, the tips of the hair glistening silvery-grey; top of head somewhat darker; under side of tail lighter; a white band between the eyes extending down to the nose-pad, which is naked; round the neck a white ring broken by a grey spot; ring round the eyes, and hair of ears, brownish-black; cheeks, lips, chin, throat, breast, belly, inner side of limbs, upper side of hands and feet, yellowish-white, and inclining to greyish-white, where it merges into the upper side. Length, $9\frac{1}{4}$ inches; tail, 8 inches.

Skull depressed; brain-case flat and short; facial portion blunt; inter-parietal bone broad and short. Posterior upper pre-molar broader than the median, and broader than the same tooth in *O. samati*, the median pre-molar lacking the inner cusp. Nasal bones sharply keeled in the mid-line.

Distribution.—Of this species only the three specimens, in the British Museum, are yet known. They were obtained near Fort Dauphin, on the south-east coast of Madagascar.

Habits.—Nothing is known of the habits of either of these two species of *Opolemur*.

THE TRUE LEMURS. SUB-FAMILY III. LEMURINÆ.

The third sub-family of the *Lemuridæ* contains the True Lemurs, which are characterised by the possession of a soft, thick, and woolly fur, the head rounded behind, with a specially elongated muzzle. They have small and oval ears, with the exterior aspect covered with long hair, but the inside naked, except round the margin. Their hind-limbs do not show so great a disproportionate length compared to that of the fore-limbs, as in the next sub-family, the *Indrisinæ*. The ankle-bones (*tarsus*) are only slightly elongated, and their toes are not united by a membrane. Their long and bushy tail is sometimes longer and sometimes shorter than the body. The females produce one or two, nearly naked, young at a birth, the mammæ being either two or four in number. The skull presents a central ridge on the frontal bone, and its facial portion is much elongated, the inter-orbital space being depressed and wider, and the orbits also directed somewhat outward and less straightforwardly than in several of the genera already noticed. The maxillary bones are generally much reduced, and the incisor teeth carried by them not unfrequently entirely aborted. The teeth in this Sub-family vary in number from 32 to 36, the dental formula being $I^{0\frac{1}{2}-2}$, C^1 , $P^{\frac{3}{3}}$, $M^{\frac{3}{3}}$. The foot is slightly elongated by the lengthening of the *naviculare* bone of the ankle, the others being short. In the wrist (*carpus*) the central bone (*centrale*) may be present or absent; its absence, however, is a character which is met with otherwise only in Man, the Chimpanzees, and the *Endrina* and some other Lemurs, to be described later on. The cæcum is not markedly developed.

The external coloration of the species of this Sub-family is remarkably variable, the variation being chiefly in the upper portion of the hairs, as their base is generally slate-grey.

The sub-family *Lemurinae* embraces four genera: the True Lemurs (*Lemur*), of which there are now eight recognised species; the Hattock (*Mixocebus*), with a solitary species; the Gentle-Lemurs (*Hapalemur*), containing two species, and the Sportive-Lemurs (*Lepidolemur*), with seven species. Some of the most elegantly coloured species in the Animal Kingdom belong to this group. They are gregarious, and most of them arboreal, though some are not so. They form rather an exception to the general rule among Lemurs, in not being nocturnal. They feed during the morning and evening, emitting loud cries as they move about, and during the heat of the day, they often lie stretched out in the sun; at night they rest with their long tails coiled about them. In their mode of progression they are more quadrupedal than most of the other Lemuroids; they jump, walk, or run on all fours. Their food consists of fruits, birds' eggs, birds and insects. Their infants are carried about close to, and concealed amid, the hair of their mother's breast; when older they cling to her back.

The True Lemurs are all inhabitants of Madagascar and of the adjacent Comoro Islands. They are unknown on the African continent.

THE TRUE LEMURS. GENUS LEMUR.

Prosimia, Brisson, Regn. Anim., p. 220 (1756).

Lemur, Linn., Syst. Nat., i., p. 44 (1766).

Varecia, Gray, P. Z. S., 1863, p. 135.

This genus contains the typical Lemurs, in their most restricted sense. They are characterised by having a very

Fox-like head, and an elongate and tapering face, shelving on each side of the nose. A long fringe of hair surrounds their chin and cheeks. They have all large and tufted ears, and large eyes, with superciliary ridges rising higher than the forehead. Their tail is always half as long as the body at least. The fore-limbs are somewhat shorter than the hind-limbs, and both the wrist and ankles are haired. The ankle is not elongated, nor is the great toe as large as in the next family—the *Indrisinæ*. On the outside of the palm of the hand and under the base of the fingers are situated fleshy pads, giving them greater grasping power. The True Lemurs have only one pair of mammæ, which are situated on the breast.

In the skull the facial region is much elongated, its measurement from the anterior margin of the orbit forward being greater than the longitudinal diameter of the orbit, and the space between the eye-sockets is narrow and depressed. The bony palate is short, extending back only to the posterior end of the median molar. The posterior portion of the ear-capsules (the mastoidal and squamosal regions) is not inflated—a character which separates this genus from *Galago*. The pre-maxillary bones are large and protrude in front, if the skull be viewed from the side. The angle of the lower jaw is not produced downwards and backwards. In some species a large maxillary sinus projects into the anterior part of the orbit; in some also the *foramen rotundum* does not coalesce with the sphenoidal fissure (see page 11), but has a distinct opening. The teeth are of the normal number, namely thirty-six. In the upper jaw the incisors are small, sub-equal, and situated anteriorly to the canines and are not in contact with each other, or with the latter. The canines are very large, tusk-like, and set in an excavated notch on the jaw. All the pre-molars

have one main cusp to the outside ; the anterior pre-molar, however, has a supplementary minute front cusp, while the median has in addition one large interior cusp ; both it and the posterior pre-molars are vertically taller than their anterior fellow. The molars have two inner cusps, and two main outer cusps with a supplementary minute fore cusp, as well as two cusps on the ridge joining the fore and hind outer cusps ; the posterior molar—the smallest of the three—is, however, larger than the posterior pre-molar, and has only the front inner cusp and no supplementary external cusp. The lower jaw shows a gap between the canine and the anterior pre-molar. The anterior pre-molar, which is vertically taller than the rest, is edged and cutting, taking the place of a tusk ; the anterior and median pre-molars are also separated by a small space ; the latter, which is equal in vertical height to the posterior, has an inner cusp and a low cusped heel. The molars have two outer main cusps, of which the front one is more developed than the hind one, and two inner cusps, often with an intermediate cusp between them ; the pair of fore and the pair of hind cusps are joined by transverse ridges, and the two outside cusps by a backwardly directed semicircular ridge ; the posterior molar is four-cusped.

The dorsal and lumbar vertebræ together do not exceed twenty in number.

The hind portion of the cerebellum is large, which points to intellectual inferiority in the True Lemurs as compared with the Apes.

The species of this genus are all confined to the island of Madagascar and some of the smaller adjacent islands. They are gregarious, living in large companies in the forests, feeding on fruits, insects, and such small animals, birds, and lizards

as they may capture. Like the Howlers of S. America and the Gibbons of the East Indies, they are very noisy. Their agility is wonderfully great, and is displayed chiefly in the evening. During the brighter hours of the day they sit somnolent, either alone with their heads buried between their arms, their tail coiled round the neck, or in twos or threes embracing each other with their arms. In walking they use their forelimbs less as hands, and more as feet than do the members of the next family—the *Indrisinæ*—both when on the ground, as well as when climbing among the trees.

I. THE RUFFED LEMUR. LEMUR VARIUS.

Lemur macaco, var. Schreber, Säugeth., p. 142, pl. 40 B (1775).

Lemur macaco et *L. ruber*, Geoffr., Ann. Mus., xix., p. 159 (1812).

Lemur varius, Is. Geoffr., Cat. Méth. Primates, p. 71, no. 2 (1851); Schl., Mus. Pays. Bas., vii., p. 301 (1876); Milne-Edwards et Grandid., H. N. Madag., Mamm., Atlas, pls. 123-129 (1690).

(Plate VII.)

Characters.—Face and top of head black; a stripe over the eyes, ridge of nose and tip of nostrils, creamy-white; a patch on the shoulder, the inside of the fore-legs, the inner surface of body, a patch on the front of the thighs, the inner side of the limbs, and the feet, black; tail black, washed with white on the upper surface; rest of body creamy-white.

The Ruffed or Variable Lemur derives its name from the remarkable variability of its external markings: so much is this the case, indeed, that not a few of them have been described as distinct species. This variability appears to be entirely individual, and is by no means constant. The Black-



THE RED-RUFFED LEMUR.

mantled variety has the back of the neck, the shoulders and interscapular region entirely black. Another form has the ears, the ruff, and a bar across the muzzle extending over and in front of the eyes, joining the ruff, pure white; the fore-arms, legs, a bar across the buttocks joining the thighs greyish-white; face, legs, and tail black; a ring encircling the body like a belt between the fore- and hind-limbs, yellowish-white; rest of body dark reddish-brown. A third variety has the ears, ruff, and outer side of the arms and legs pure white; the flanks rusty-red, the rest of the body black.

THE RED-RUFFED LEMUR (*L. ruber*) is a very well-marked variety of the same species, and may easily be recognised by the ears, ruff and whole upper surface of body being dark rusty-red, with the outer surface of thighs and legs white; or, the ears, ruff and whole upper surface (except a white patch on the back of the neck) may be dark brown, with a white garter on each ankle; otherwise it may be entirely black. It is this variety which we have figured on Plate VII.

Distribution. —Throughout the north-east of Madagascar.

Habits.—The Ruffed Lemur, called by the natives “Vari-kossi,” has a loud, harsh and powerful voice, which can be heard for a long distance.

II. THE BLACK LEMUR. LEMUR MACACO.

Lemur macaco, Linn., S. N., i., p. 44 (1766); Schl. Mus. Pays.

Bas., vii., p. 302 (1876); Milne-Edwards et Grandid., H.

N. Madag., Mamm., pls. 131, 132 (1890).

Lemur niger, Schreb., Säugeth., pl. 40 A (1775).

Lemur leucomystax, Bartlett, P. Z. S., 1862, p. 347, pl. xli. (female).

Varecia nigra, Gray, P. Z. S., 1863, p. 136.

Characters.—Ears tufted, with long hairs continuing down the side of the neck to the angle of the mouth.

Male.—Entirely black.

Female.—Formerly described as a distinct species, and known as the White-whiskered Lemur (*L. leucomystax*). Face and lips black, darkest on the nose, round the eyes and hinder part of the head; forehead blackish-grey; whiskers and ear-tufts white, almost concealing the ears. General colour of body rich ferruginous brown, darker on the middle of the back; arms, legs and neck reddish-yellow; tail whiter; throat, under side of body and inner side of limbs creamy-white.

There is a considerable amount of variation in this species. Some individuals have the lower back and base of tail white; the belly greyish-white, the feet brown, and the toes black. In others the black frontal spot is wanting, the back of the head being reddish-white; the basal half of the tail is dark orange-red, remainder of the body rich rusty-brown. On the fore-arm is a cluster of stiff hairs, which occurs in association with a large underlying sweat-gland, whose function is not yet understood.

Distribution.—The north-west coast of Madagascar.

Habits.—The special habits of this species of Lemur are unknown, but in all probability they agree with those of the group in general, as given under the heading of the genus. It is said to utter a coarse grunting call-note.

The young males are born black like the father, and the young females have the colour of the mother. Dr. Sclater has observed that in specimens in confinement in the Zoological Gardens, in London, the female carried her young one transversely across her belly, its long tail passing round her back and then round its own neck.

III. THE MONGOOSE LEMUR. LEMUR MONGOZ.

Lemur mongoz, Linn., S. N., p. 44, no. 2 (1766); Sch., P. Z. S., 1871, p. 231, figs. 1, 2; Schl., Mus. Pays. Bas., vii. p. 312 (1876); Milne-Edw. et Grandid., H. N. Madag., Mamm., pls. 133-153 (1890).

Lemur anjuanensis, Geoffr., Ann. Mus., xix., p. 161 (1812).

Prosimia melanocephala, Gray, P. Z. S., 1863, p. 137, pl. xviii.

Prosimia xanthomystax, Gray, P. Z. S., 1863, p. 138, pl. xvii.

Characters.—Fur woolly and thick; eyelashes long; some long bristles behind the angle of the mouth; face long; no ear-tufts and whiskers, but a sub-auricular patch of long hair; some long hairs on the digits; tail bushy.

Male.—Head, face, streak across the crown of head and down the forehead brownish-black; ears of the same colour, white-fringed; cheeks and a spot on the sides of the forehead iron-grey; sub-auricular cheek-patch white, slightly washed with rufous; rest of upper surface reddish-grey; tail darker; chest and under side rufous-grey.

Female.—Rufous-brown above; neck and shoulders white; throat white; frontal spot black; face whitish.

The colour of the fur in this species varies to an extraordinary degree, and before this fact was recognised, a number of supposed species, founded on the colour of the animals alone, were described. In course of time, however, as specimens were obtained in greater number, it became evident that the variation was only in the colour of the fur, and that there was none in their anatomical and osteological structure to warrant their being considered distinct species. They have, therefore, all been now classified by Professor Milne-Edwards and M. Grandidier in their great work on the Natural History

of Madagascar, as so many varieties of one species, *Lemur mongoz*. Of these varieties, the most important are :—

THE RED-FOOTED LEMUR. *LEMUR RUFIPES*.

Male.—Face in front of a line above the eyes, dark reddish-brown ; hands and feet bright rufous-brown ; under side of body and inner side of limbs reddish-grey.

Female.—Wrist and ankles with adjacent part of limbs above brownish-red.

THE RED-FRONTED LEMUR. *LEMUR RUFIFRONS*.

Male.—Grizzly, washed with rufous ; fore-arms, hands, feet, haunches, outer side of legs, and top of the head between the ears, rufous.

Female.—Grizzly brown ; top of head grizzly black ; patch over and round the eyes greyish-white.

THE GREY-HEADED LEMUR. *LEMUR CINEREICEPS*.

Face and frontal spot black ; cheeks, sides, top of head, side of neck, and outside of ears grey ; rest of body orange-red.

THE COLLARED LEMUR. *LEMUR COLLARIS*.

Male.—Head blackish-brown ; cheeks, sides of throat, mark over eyes, and base of ears, yellowish-grey, washed with orange-red or rufous ; a spot at the side of the nose, grey ; chin, throat, and under side of the body, blackish-grey.

Female.—Centre of nose black ; sides of nose, chin, cheeks, including the eyes, ears, sides of throat, iron-grey, slightly flushed at the lower side of the neck under the ears with reddish-orange. Specimens from the island of Mayotte (*L. mayottensis*, Schl.) differ from *L. collaris* in having a blackish spot over the root of the tail.

THE RUFOUS LEMUR. LEMUR RUFUS.

Has a yellowish-white frontal band and whiskers.

THE BLACK-FACED LEMUR. LEMUR NIGRIFRONS.

Has a brownish-black band over the forehead, including the eyes; muzzle, patch on top of head including the ears, the side of the head below the ears, sub-auricular tufts, throat and under surface, grey.

THE WHITE-FACED LEMUR. LEMUR ALBIFRONS.

Forehead, top of head, ears, throat, and chest white.

Pure albino varieties are also quite common.

Distribution.—The Mongoose Lemur with its numerous varieties is found throughout the island of Madagascar, in Mayotte, and in Anjuan or Johanna Island, one of the Comoro group.

Habits.—Gregarious and diurnal, feeding on fruits, insects, and small animals.

IV. SCLATER'S LEMUR. LEMUR NIGERRIMUS.

Lemur nigerrimus, Scl., P. Z. S., 1880, p. 451, figs. 1 and 2;
Milne-Edw. et Grandid., H. N. Madag., Mamm., pls. 154,
155 (1890).

Lemur macaco (nec L.), Scl., P. Z. S., 1878, p. 1016.

Prosimia rufipes, Gray, Ann. N. H., 1871, p. 339 (female).

Characters.—Face covered with short hair; ears nude and without tufts; nose-pad and lower lips nude. Similar to *L. macaco*, but larger and more intensely black, with a raised crest of upstanding hair on the head, formed by the longer fur of the body terminating arcuately on the forehead. External ears pinkish flesh-colour. Eyes blue, turning to green. Length, 16 inches; tail, 20 inches.

Female.—(*Prosimia rufipes* of Gray) Brown ; eyes brownish-yellow.

Distribution.—Cap d'Ambra, N. Madagascar.

Nothing is known of the habits of this species.

V. THE WHITE-HANDED LEMUR. *LEMUR ALBIMANUS*.

Le Maki aux pieds blancs, Audebert, H. N. Singes, p. 10, pl. 1 (1797 : male).

Lemur albimanus, Is. Geoffr., Ann. Mus., xix., pp. 161-169 (1812); Milne-Edw. et Grandid., Hist. Nat. Madag., Mamm., Atlas, pls. 156, 157, 162-164, 165, figs. 1 and 2 (1890).

Lemur mongoz (nec L.), Schl., Mus. Pays. Bas., vii., p. 312 (1876, pt.).

Characters.—Nose sharp and Dog-like ; eyes oblique ; ears, except the central portion, haired.

Male.—Face, anterior to a line over the forehead, cheeks, snout (except a greyish wash on its sides and the upper lip) umber-brown ; rest of head, neck, down to the middle of the back, and fore-limbs, grey ; margins of ears, chin, and under surface of body white ; rest of back and hind-limbs umber-brown ; tail darker, except for a short distance at the base ; upper surface of hands and feet grey. The nose varies in different species in the amount of grey colouring, and the forehead and face in depth of brown. Some specimens also have an arcuate black band over the forehead from one outer corner of the eye to the other.

Female.—Greyish-black ; nose grey ; rest of face washed with brick-red, deeper on the forehead, cheeks, ears, and sides of neck, fainter in tint on the upper back ; lower back and tail darker, except at the base, where it is washed with reddish-yellow. Hands and feet greyish-white. The colour of the face varies much in different specimens, being deeper or lighter rufous.

The arcuate band from the corners of the eyes over the forehead varies in breadth and depth of colour.

Distribution.—Madagascar ; the precise locality unknown.

VI. THE CROWNED LEMUR. LEMUR CORONATUS.

Lemur coronatus, Gray, Ann. and Mag. N. Hist., x., p. 257 (1842) ; Schl., Mus. Pays. Bas., vii., p. 313 (1876) ; Milne-Edwards et Grandid., Hist. Nat. Madag., Mamm., Atlas, pls. 158-161, 165, 166.

Lemur chrysampyx, Scheurm. Mém. Cour. Acad. Brux., xxii., p. 6 (1848 = female).

Prosimia coronata, Gray, P. Z. S., 1863, p. 138.

Characters.—Tips of ears naked ; tail a little more than the length of the body.

Male.—Face, nose, and region round the eyes greyish-white ; cheeks and forehead rufous or yellowish-red ; a conical spot in the centre of the head between the eyes, dark brown or black, intruding sometimes on the rufous of the forehead ; ears white ; inner side of limbs and under side of body greyish-white ; tail rufous at base, the upper side blackish, and the under side lighter ; rest of body sienna-grey.

Female.—Upper side entirely grey, washed with yellowish cream-colour on the middle and lower part of the back, and on the upper side of the tail ; long black hairs present in the tail ; the under side entirely silvery-grey ; fur at base black, the tips grey or silvery ; instead of the black spot on the forehead there is a golden yellow-hooped, or widely V-shaped, bar above the eyes, narrower in the centre over the nose.

Albino specimens are sometimes found, which are entirely white, except for the golden bar over the eyes.

VII. THE RED-BELLIED LEMUR. LEMUR RUBRIVENTER.

Lemur rubriventer, Is. Geoffr., C. R., xxxi., p. 876 (1850); Schl., Mus. Pays. Bas., vii., p. 311 (1876); Milne-Edw. & Grandid., Hist. Nat. Madag., Mamm., Atlas, ii., pls. 167-170 (1890).

Lemur flaviventer, Is. Geoffr., *tom. cit.*, p. 876 (1850).

Characters.—Inner margins and outside of ears haired, the interior nude.

Male.—Face, a line down the forehead, and snout dark maroon-brown; a ring round the eyes cobalt-blue; rest of head and cheeks reddish-brown; upper side of body speckled reddish-brown, darker on the lower back; tail almost black, with long white hairs distributed throughout its length; feet rufous; under side of body pale.

Female.—Like the male, but having the cheeks whitish; a narrow ring round the eyes pale blue; upper surface umber-brown, washed with reddish-yellow; under side and inner sides of limbs yellowish; ruff reddish-chestnut.

Young.—Head entirely rufous; nose black.

Distribution.—Madagascar.

VIII. THE RING-TAILED LEMUR. LEMUR CATTÀ.

Lemur catta, Linn., S. N., i., p. 45, no. 4 (1766); Schl., Mus. Pays. Bas., vii., p. 314 (1876); Milne-Edw. et Grandid., Hist. Nat. Madag., Mamm., Atlas, pls. 171-172 (1890).

Characters.—Inside of ears naked; no ruff round the face; top of head greyish-black; face, rest of head, lower surface of body, and inner side of the limbs pearl-grey; upper surface sienna-grey. Tail pearl-grey, banded with from ten to twelve black rings, distinguishing it from all other Lemurs, which have the tail of one colour. Length of body and tail together, 40 inches.

On the fore-arm above the wrist-joint there is, in both sexes, a comb-like bony outgrowth (becoming in old males a prominent spur) continuous with the palm of the hand by means of a narrow strip of black, hairless skin; near it there is a cluster of long stiff hairs over an underlying sweat-gland, the function of which is still unknown.

Distribution.—This species inhabits chiefly the rocky and treeless regions of the south and south-western borders of the Betsileo province of Madagascar. It is, however, not entirely confined to these treeless districts, for it has been recorded as occurring in bands of some numbers in the neighbouring forest regions.

Habits.—The Ring-tailed Lemur—one of the handsomest species of the genus and the only one in which the tail is not uniformly coloured—is of gentle manners, active, and graceful. According to the notes of the Rev. G. A. Shaw, as recorded in a paper in the Zoological Society's "Proceedings," it lives among the rocks where a few stunted trees occur, and over this rocky ground it can easily travel, in places where it is impossible for the natives, although bare-footed, to follow it. The palms of its hands and feet are smooth and leather-like, enabling the animal to apply them firmly to the wet rocks. This Lemur feeds on bananas and wild figs. In the winter its chief sustenance consists of the prickly-pear, peeling off the spiny skin with its long upper canines. According to the same observer, this Lemur rarely drinks water; indeed, it is said that the species living in the west of Madagascar, including two kinds of White Lemur, subsist without water, while those on the east coast invariably drink water with their meals. When fighting, the Ring-tailed Lemur scratches vigorously and strikes out with its hands.

THE HATTOCKS. GENUS MIXOCEBUS.

Mixocebus, Peters, M. B. Akad. Berlin, 1874, p. 690.

This genus contains but one species, whose characters are therefore those of the genus also.

THE HATTOCK. MIXOCEBUS CANICEPS.

Mixoccebus caniceps, Peters, M. B. Akad. Berlin, 1874, p. 690, pl. i., pl. ii. (Skull.)

Characters.—Snout sharp, with a naked nose-pad; eyes very large; ears very short, rounded, higher than broad, scarcely appearing beyond the fur, and sparsely covered with short hair; limbs long, the digits with unkeeled nails; tail as long as the body, or slightly longer; inter-maxillary bones more prominent than in the species of the next genus, and containing a small incisor tooth on each side; no inter-parietal bone; upper canine not vertically longer than the grinders; the upper pre-molar and molar series of teeth arranged to converge but slightly anteriorly, forming, as seen from the front, a somewhat convex line, differing in this from some species of *Lepidolemur*, in which these teeth are arranged in a nearly straight line.

Top of head grey, the base of the hairs Mouse-grey, with black or white tips; a triangular patch on the middle of the head, darker; band on the sides and middle of the nose dark brown, widening out on the forehead and over the eyes; a dark ring round the eyes, merging into the dark brown colour of the nose; front border of the ears, a patch behind the latter, the lips, chin, sides of cheek, and chest a creamy- or yellowish-white; throat grey; upper side of the body, outside of the limbs, and dorsal end of the tail, rufous-grey; back portion of

the upper part of the thigh, the hinder part of the belly, and the greater part of the upper side of the tail yellowish-rufous; the upper side of hands dark brown, of the feet yellowish-grey; extremity of tail blackish-brown. Length of body, $12\frac{1}{2}$ inches; tail, $13\frac{1}{2}$ inches.

Distribution.—Confined to Madagascar.

Habits.—The habits of the Hattock, as the natives name this animal, are quite unknown.

THE GENTLE-LEMURS. GENUS HAPALEMUR.

Hapalemur, Is. Geoffr., Cat. Méth. Primates, p. 74 (1851).

This genus has been constituted for two species of a specialised type of Lemur, characterised by a globose head, a short muzzle, with a tapering nose and short hairy ears. The hind-limbs are longer than the fore-limbs, the feet short and broad, and the tail hairy and equal in length to the body. The female has four teats, two on the breast, or on the shoulder, and two on the abdomen.

In regard to their skeletal characters, the facial portion of the skull is short and narrow in front—the nasal bones being arched—and the brain-case rounded. The cranium presents no elevated frontal crests, as among the members of the next genus (*Lepidolemur*). The pre-maxillary bones are very small. The hind margin of the bony palate, which dilates posteriorly, does not extend behind the mid-line of the last molar. The squamosal region of the skull and the outer and posterior—the mastoidal—portion of the ear-capsules (periotic bones), is not inflated in the members of this genus. Their lower jaw is very characteristic, being massive in front and possessing a very long symphysis (or line of junction of its two halves), its angle being

also very large, and produced downward, inward, and backward, even more than in the genus *Indris*. The *naviculare* bone of the ankle (*tarsus*) is relatively short, thus differing from the same region in *Microcebus* and in *Galago*; the *carpus* (or wrist) has no central (*os centrale*) bone.

In *Hapalemur* the teeth are of the normal Lemurine number, viz., 36; but the dentition as a whole is peculiar and characteristic. Each series of teeth is very uniform and equal, and those anterior to the molars are serrated. In the upper jaw the incisors are very small, sub-equal, and situated close together, the posterior tooth on each side being (when the skull is viewed from the side) internal to and touching the canines. The canines are small, and the gap between them and the anterior pre-molar is very small. The anterior pre-molar is slightly taller vertically than its median fellow, and stands close up to it without an interval; it has one main (and sometimes one rudimentary) outer cusp; the posterior pre-molar, which closely resembles a molar, and is often the largest tooth in the jaw, having one inner cusp united by ridges to its two outer cusps. The molar teeth are sub-equal to the hindmost pre-molar, and have one front inner and two outer cusps, without an oblique ridge between them, and also a well-developed cingulum, cusped externally. Of the lower teeth, the anterior and median pre-molars are set obliquely, the median having three outer and two inner cusps (the two inner being united to the two hind outer by ridges). The posterior pre-molar is quite molariform, and, with the molars, presents three outer and two (or three) inner cusps, of which the two inner are united by ridges to the outer hind cusps, while transverse ridges unite the main outer and inner cusps together. The molars are cingulate towards the outside.

The brain is narrower and shallower than that of the genus *Lemur*, and presents no specially close resemblance to the same organ in the *Indrisinæ* or the *Lorisinæ*.

I. THE GREY GENTLE-LEMUR. HAPALEMUR GRISEUS.

Lemur griseus, Geoffr., Mém. sur les Makis. Mag. Enc., i., p. 48 (1796).

Hapalemur griseus, Is. Geoffr., Cat. Méth. Primates, p. 74 (1851); Mivart, P. Z. S., 1864, p. 613 (Skull); Schleg., Mus. P. B., vii., p. 361 (1876).

Hapalemur olivaceus, Is. Geoffr., Cat. Méth. Primates, p. 75 (1851); Schl., Mus. P. B., vii., p. 316 (1876).

Cheirogaleus griseus, Giebel., Säugeth., p. 1018 (1856); V. der Hoeven, Tijds. Natuurl. Gesch., p. 38, pl. i., fig. 1 (1844).

Hapalolemur griseus, Schl., P. Z. S., 1863, p. 161; Gray, P. Z. S., 1863, p. 828, pl. lii.

(Plate VIII.)

Characters.—Fur long and soft, not woolly; ears short, hairy, with long black vibrissæ between them; tail bushy, and as long as the body; general shade above greyish Mouse-colour, washed with rufous and speckled with black on the crown, back and external surface of limbs; shoulders and fore-limbs bluish-grey; cheeks, throat, breast, and inner side of limbs ochraceous white; under side of body whitish-yellow; tail and hands grey, washed with black. Body and tail equal, 15 inches in length.

Facial portion of skull short; brain-case rounded; lower jaw shorter and higher than in Lemurs generally; great toe large and broad; on the inner side of both arms close to the wrist occurs a rough patch (extending down to the bare skin of the palm) corresponding to a gland beneath,

in the male, spine-like, while in the female hairy processes are present, together with a tuft of long hairs; external to this patch is a callous pad; mammae opening on the shoulder; intestine large; cæcum small.

Young.—Reddish-yellow below.

Distribution.—The Grey Gentle-Lemur inhabits the eastern side of the Betsileo province of Madagascar.

Habits.—The “Bokombouli,” as the natives name this animal, is the smallest of any of the True Lemurs. It is nocturnal, and lives, according to the Rev. G. A. Shaw, among the bamboos in the higher-level forests of the island. Its lower incisors are used as scrapers, and nearly all its teeth are serrated and very effective in cutting off the bamboo shoots, on which it feeds. To enable it to grasp smooth surfaces, such as the stems of the bamboo and other trees it frequents, it possesses a broad pad under each great toe.

II. THE BROAD-NOSED GENTLE-LEMUR. *HAPALEMUR SIMUS*.

Hapalemur (Prolemur) simus, J. E. Gray, Cat. Monkeys, Brit. Mus. App., p. 133 (1870); id. P. Z. S., 1870, p. 828, pl. lii., pp. 829, 830, figs. 1-4 (Skull).

Prolemur simus, J. E. Gray, P. Z. S., 1872, p. 851.

Hapalemur simus, Beddard, P. Z. S., 1884, p. 392; Jentink, Notes Leyd. Mus., vii., p. 33 (1885).

Characters.—Nose broad and truncated; ears short, covered with long hair on the outside and along the margin inside.

Very similar to *H. griseus*; head and upper back dark reddish-grey, faintly washed with rufous; sides of head, neck, and region round the eyes lighter; sides of nose and region between the eyes black; ears dirty grey; lower back, sides of



THE GREY GENTLE-LEMUR.

body, and outer surface of limbs sooty-grey, with here and there a wash of rufous ; the patch on the end of the rump and upper part of the base of the tail uniform pale yellowish rust-colour ; remainder of tail sooty-grey ; from the chin to the chest yellowish-grey ; under side of body and inner side of arms pale sooty-grey.

No spines on the fore-arm above the wrist as in *H. grisens*. In the skull, the nose is broad, square, and truncated ; the premaxillæ very small ; the lower jaw weak and narrow in front.

Distribution.—Only known from Madagascar.

Habits.—The habits of the Broad-nosed Lemur are said to differ in no respect from those of the foregoing species.

THE SPORTIVE-LEMURS. GENUS LEPIDOLEMUR.

Lepilemur, Is. Geoffr., Cat. Méth. Primates, p. 75 (1851)

Lepidolemur, Peters, M. B. Akad. Berlin, 1874, p. 690 (1874).

This genus contains, according to Dr. Forsyth Major, as many as seven species. This excellent comparative anatomist has made a very careful revision of the group, and the present writer has gratefully to acknowledge from him many valuable notes incorporated under this section, as well as his kindness in supplying for publication the diagnoses of his new species.

Dr. Major divides these seven species into two series :—(A) a group of four larger species, and (B) a group of three smaller species.

The members of this genus are smaller than the True Lemurs of the genus *Lemur*. Their head is conical and short, their ears large, round, and membranaceous, and the tail is shorter than the body. In this latter character and in their shorter limbs they differ from *Mixocebus*. The fourth finger and toe are the longest digits of their respective extremities, the nails of all are keeled, and that of the great toe is very large and flat.

In the skull, the muzzle is longer than the longitudinal diameter of its orbit in the series of larger species (Section A) ; in the smaller species (Section B) the muzzle is shorter.

Their dentition presents several important characters. The series of upper molars and pre-molars form almost a straight line, both sides being almost parallel, or only slightly convergent towards the front. In the upper jaw the incisors are wanting ; the canines are very large and grooved internally, and have a posterior heel. There is no gap between them and the anterior pre-molar, which last is vertically taller than the rest, and has one cusp to the outside, whereas the median and posterior have an inner cusp as well. The anterior and median molars have the inner hind cusp rudimentary, but the cingulum rises into a minute cusp, both at the fore and hind edge ; the posterior molar is three-cusped. The whole of the cheek-teeth gradually broaden and decrease in vertical height from before backward as far as the median molar. In the lower jaw the anterior pre-molars are large, canine-like, and decumbent, and have a strong process on their anterior margin (resembling that in the corresponding tooth in *Indris*) ; the median and posterior pre-molars have one external cusp, and the latter tooth one interior cusp in addition. The anterior and median molars have a rudimentary fifth cusp, which is large in the posterior molar.

The pre-maxillæ are very much reduced, so that the teeth they usually carry are generally wanting. The bony palate is short, its hind margin extending back only to the middle of the median molar ; its anterior foramina are small ; and it differs from that of *Microcebus* and *Chirogale* in having its posterior perforations small. The angle of the lower jaw is produced downwards and backwards. The mastoid portion of the ear-capsules (periotic bones) as well as the squamosal are markedly en-

larged and swollen, in this respect differing from the skulls of *Lemur* and *Hapalemur*. The ridges in the temporal bone unite into a frontal (sagittal) ridge, and the space between the orbits is depressed; a depression is also present on the cheek in front of the lachrymal foramen. The foot is slightly elongated by the lengthening of the *naviculare* bone of the ankle (*tarsus*), the thin bones of which are short. In the wrist (*carpus*) there is no *os centrale* or central bone, which is otherwise invariably present in the Primates, except in Man, the Chimpanzees, the Gentle-Lemurs, and the Endrina.

The Sportive-Lemurs are confined to Madagascar and are nocturnal and arboreal creatures, feeding on leaves and fruits.

In Group A (the larger species) are included: 1, The Weasel-like Lemur (*L. mustelinus*); 2, the Red-tailed Sportive-Lemur (*L. ruficaudatus*); 3, Edwards' Sportive-Lemur (*L. edwardsi*); and 4, the Small-toothed Sportive-Lemur (*L. microdon*). Group B (consisting of the smaller species) comprises: 1, The Round-headed Sportive-Lemur (*L. globiceps*); 2, Grandidier's Sportive-Lemur (*L. grandidieri*); and 3, the White-footed Sportive-Lemur (*L. leucopus*). With the exception of the two first-named species, all the others are here made known for the first time by Dr. Forsyth Major. Very little is recorded of the habits of these animals. They are so rare that at present the various species are known from a few skins or alcoholic specimens in European museums. They are said to be inhabitants only of the forest-country, nocturnal in their habits, sleeping coiled up in some retreat all day, but issuing forth at night, at which time they are very agile in their movements.

SECTION A. (SPECIES MAJORES.)

I. THE WEASEL-LIKE SPORTIVE-LEMUR. LEPIDOLEMUR
MUSTELINUS.

Lepilemur mustelinus, Is. Geoffr., Cat. Méth. Primates, p. 76 (1851); Schl. et Pollen, Faun. Madag., Mammif., p. 10, pls. 4, 6, fig. 3; Schl., Mus. P. B., vii., p. 317 (1876).

Lepilemur dorsalis, Gray, Cat. Monkeys, Brit. Mus. App., p. 135 (1870).

Characters.—Fur soft and woolly; ears rounded, naked excepting at the base behind; muzzle elongated. Above, reddish-grey. Face and cheeks grey; throat white; under side of body and inner side of limbs, pale grey; tail short-haired, the posterior third dark brown. Length of body, 14 inches; and tail 10 inches.

Skull large and massive; the brain-case small and inflated; facial region long, differing in this character from *L. ruficaudatus*; orbits very large, thus differing from the three remaining species of the larger group (A); the process of the maxilla intervening between the nasal and lachrymal bones; molar teeth large.

Distribution.—This species occurs in the north-east of Madagascar, and, according to Grandidier, in the north-western corner of the island.

Habits.—The “Pitili-ki,” as the natives have named this animal, is found in the forests in small companies. It is nocturnal in its habits, feeding on leaves and fruits.

II. THE RED-TAILED SPORTIVE-LEMUR. LEPIDOLEMUR
RUFICAUDATUS.

Lepilemur ruficaudatus, Grandidier, Rev. et. Mag. de Zool., 1867, p. 256.

Lepilemur pallidicauda, Gray, P. Z. S., 1872, p. 850.

Lepilemur mustelinus (nec. Is. Geoffr.), Schl., Mus. P. B., vii., p. 317 (in part).

Characters.—Smaller than the last species ; head much broader than it is long ; snout short and conical ; ears ovate, exposed, short-haired ; tail long, thicker at the end, and covered with softer and longer hairs. Fur pale or reddish-grey ; head dark brown ; the shoulders and outer side of the arms grey, washed with brown ; chin, breast, and inner side of limbs and under side of body whitish ; upper side of the base of the tail rather dark brown, this colour extending further down in the tail of the female ; rest of the tail uniform pale brownish or greyish-red.

Skull very broad compared with its length, more massive, and showing a shorter muzzle than in *L. mustelinus* ; orbits smaller than in any of the other species in Group A.

Distribution.—South-western Madagascar.

III. MILNE-EDWARDS' SPORTIVE-LEMUR. *LEPIDOLEMUR* EDWARDSI.

Lepidolemur edwardsi, Forsyth Major.*

Characters.—"Similar to *L. ruficaudatus* ; upper part of head grey ; ears membranaceous, but encircled on the inner and posterior side by an incomplete belt of dark brown colour, which distinguishes the species from *L. ruficaudatus* ; shoulders and outer side of the fore-limbs reddish-brown. Back greyish-brown, lighter on the outer side of the hind-limbs ; an uninterrupted dark dorsal streak from the middle of the back to the centre of

* N.B.—These descriptions of new species have been kindly supplied by Dr. Forsyth Major from his MSS., and I am much indebted to him for allowing them to be first published in the present work.

the forehead is very conspicuous between the shoulders. Breast, inner sides of the fore- and hind-limbs, and lower surface of the body greyish-white.

“The skull long and narrow ; molars and pre-molars large, especially transversely ; orbits small, yet larger than in *L. ruficaudatus* ; the mastoidal portion of the ear-capsules and squamosal region of the skull conspicuously inflated. Bony palate more elongate than in *L. mustelinus* ; par-occipital process present.”

Distribution.—Betsako, north-west of Madagascar.

IV. THE SMALL-TOOTHED SPORTIVE-LEMUR. LEPIDOLEMUR
MICRODON.

Lepidolemur microdon, Forsyth Major.

Characters.—“Somewhat similar to the Weasel-like Lemur (*L. mustelinus*) in coloration, but having the back and the outer portion of the shoulder and fore-limbs bright chestnut, passing into russet on the back (darker between the shoulders), on the outer parts of the hind-limbs and tail, as well as on the top of the head, where it is washed with greyish. A dark, dorsal stripe from the centre of the forehead to the middle of the back, where it is darkest. Breast and under surface of body yellowish-grey.

“Skull markedly distinguished from that of the other species by the small size of the molars ; pre-molars not diminished in size ; a depression at the base of the nasals ; the bony palate more elongated than in *L. mustelinus*.”

Distribution.—The eastern districts of the Betsileo province, Central Madagascar.

SECTION B. (SPECIES MINORES.)

V. THE ROUND-HEADED SPORTIVE-LEMUR. LEPIDOLEMUR
GLOBICEPS.

Lepidolemur globiceps, Forsyth Major.

Characters.—“The smallest of the Sportive-Lemurs. Similar to *Lepidolemur ruficaudatus*, but less rufous down the forelimbs; the tail drab colour.

“Skull very characteristic; the brain-case broad, high, and globose, the facial region short; the premaxillæ more reduced than in any other species; the external auditory channel very large; the occipital region less vertical than in the species of Section A.”

Distribution.—Ambulisatra, south-west Madagascar.

VI. GRANDIDIER'S SPORTIVE-LEMUR. LEPIDOLEMUR
GRANDIDIERI.

Lepilemur mustelinus, Gray (nec Geoffr.), P. Z. S., 1863, p. 144.
Lepidolemur grandidieri, Forsyth Major.

Characters.—“General colour cinnamon; head greyish; an indistinct median dorsal streak from the forehead along the back; inner side of the limbs and under side of the body yellowish-grey.

“Skull remarkable for the large size of its orbits, and for the anterior convergence of its upper dental cheek-series being greater than in the other members of the group.”

Distribution.—North-west Madagascar.

VII. WHITE-FOOTED SPORTIVE-LEMUR. LEPIDOLEMUR LEUCOPUS.
Lepidolemur leucopus, Forsyth Major, Ann. and Mag. Nat.
Hist., xiii., p. 211 (1894).

(Plate IX.)

Characters.—Ears large, long, membranaceous; tail shorter than the body. Upper side Chinchilla-grey, with an indistinct median brownish stripe from the neck to the root of the tail. Top of head brownish-grey, with a darker median stripe; cheeks and chin whitish. Ears encircled by a broad ring of whitish hair. Neck, shoulders, and upper parts of the forearm pale rufous. Breast and belly greyish-white; inner surfaces of the hind-limbs and the heels pure white.* Tail greyish, with a rusty tinge. Length, 12 inches; tail, 10½ inches.

The skull is longer and broader than that of *L. grandidieri*; the mastoidal portion of the ear-capsules and the adjacent squamosal region very largely inflated; bony palate elongated; dental cheek-series short; molar teeth small and slender, distinguishing this species from *L. grandidieri*, their small size also separating it from *L. globiceps*.

Distribution.—This species is at present known only from Fort Dauphin in the south-east of Madagascar. [Type in British Museum.]

THE ENDRINAS. SUB-FAMILY INDRISINÆ.

This, the last sub-family of the *Lemuridae*, is considered to contain the highest members of the whole Sub-order. They are distinguished by having their fur abundant, longer and woolly above, shorter beneath, with the hands and feet haired to the tips of the digits. Their head, set at right angles to the spinal column, is rounded, the face elongated and naked, with a deep furrow separating the nostrils. The eyes are large, and have a third eyelid, or nictitating membrane, to draw across the pupil during the day. The ears, which are naked inside and fringed

* N.B.—The white feet should have been more pronounced in the plate.



THE WHITE-FOOTED SPORTIVE-LEMUR.

on the outside, are moderately long and buried in the fur, but are less movable at will than is the case with the Galagos. Their fore-limbs are much shorter than the hind ones. The arms, which are united to the body by a parachute-like fold of integument, have long, narrow, and strong hands, of which the thumb is short, set far back, and but little opposable. The rest of the fingers, except the index, which is short, are long and slender, and terminate in a round disc. The feet are elongate, and the great toe, which is freely opposable to the other toes, is very large and broad, being, indeed, nearly as wide as the rest of the digits together; the remaining toes are united by a membrane as far as the second segment. The females have the mammæ situated on the breast.

In the skull the facial region is relatively small, and the cranial region relatively large. The external nostrils communicate with a cavity on the underlying bone; the pre-maxillary bones are deeply excavated in front, and the anterior perforations in the bony palate, behind the incisor teeth, are large. The lower jaw has its angle large, produced backwards, the line of union of its two halves being long, and its lateral movements very limited. In regard to their dentition, the number of the milk-teeth in the young individual is greater than that of the permanent set in the adult, the formula of the former being $I_{\frac{2}{2}}^2, C_1^1, P_{\frac{2}{3}}^2 [M_{\frac{3}{3}}^3]$, while that of the latter is $I_{\frac{2}{2}}^2, C_0^1, P_{\frac{2}{3}}^2, M_{\frac{3}{3}}^3$, the lower canine and one lower pre-molar having disappeared. In the upper jaw the incisors are very small, the outer one standing behind the inner one, with a space between the former and the canine; the canines are long, curved behind, and set close up to the anterior pre-molar. The pre-molars are longer than they are broad, laterally compressed, and present to the outside one main triangular cusp with a small accessory cusp on each

side, the posterior tooth of the series having a hind inner cusp. The anterior and median molars are four-cusped, of which the outer and inner pairs are separated by a longitudinal groove; to the outside they have one supernumerary cusp on each main cusp, and one between them. The median molar is the largest tooth of the jaw, and the posterior is small, triangular and three-cusped. Of the lower jaw, the outer pair of the long, and almost horizontally protruding incisors, is larger than the inner pair, and is separated by a space from the anterior pre-molar. Of the elongate laterally compressed pre-molars, the anterior is the larger, and is vertically taller than its fellows, being slightly depressed forward and curved behind; the posterior pre-molar has one cusp. The molars have four cusps, of which the inner ones alternate with the outer cusps.

The intestinal canal in the *Indrisinæ* is very long, the cæcum, or blind diverticulum at the junction of its two portions, being extremely long and large, occupying, indeed, a great part of the abdominal cavity. The main arteries of the fore- and hind-limbs do not break up into a *rete mirabile*, or series of small parallel vessels, as in many other Lemuroids.

In this group, while the sense of smell is very perfect, that of hearing is less acute than in the other Sub-families; and that of touch conspicuously blunt, both in the fingers and toes, which are chiefly climbing and not tactile and prehensile organs, as they are in the corresponding limbs of the Anthro-poids. The female never produces more than one young at a birth.

The convolutions of the brain are few, but they are more complicated than in many of the South American Monkeys. In very young individuals the cerebellum is more covered by the cerebrum than it is in the adult.

The species of this Sub-family are confined to the island of Madagascar. Our knowledge of their general characters, anatomical structure and habits, is very complete, through the researches, both in the field, of M. Grandidier, and in the study, of Prof. Alphonse Milne-Edwards. These results are published in their magnificent "Histoire de Madagascar," to which the reader is referred for fuller information.

The *Indrisinæ*, on account of their superior organisation, and especially their relatively large brain, are considered to be the highest of all the Lemuroids. They are essentially arboreal. If they come to the ground they sit upright on their hind-legs, and progress by jumps, holding their arms above their heads. They are easily tamed, and become gentle in confinement; but they are not very intelligent. The Endrinas "never manifest in any very marked manner," so MM. Milne-Edwards and Grandidier tell us, "the passions that affect the Apes so vividly; their countenance, almost as immobile as that of an herbivorous or carnivorous animal, exhibits neither anger nor pleasure. In captivity they do not seek to be caressed; they appear neither to become attached to their master, nor to take interest in anything about them." Many of their actions, however, and the peculiar sounds they often utter, recall those of Monkeys.

Some of the species are diurnal and others nocturnal.

The Sub-family has been divided into three genera, *Avalis* with one species; *Propithecus*, with three species, and *Indris* with a single species. All its members are remarkable for the extraordinary amount of variation in the coloration of their fur.

THE AVAHI LEMURS. GENUS AVAHIS.

Avahi, Jourdan, C. R., Journal l'Inst., ii., no. 62, p. 231 (1834).

Avahis, Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., i., p. 320 (with full synonymy).

This genus is monotypic, containing but a single species, whose characters include necessarily those of the genus.

I. THE WOOLLY AVAHI. AVAHIS LANIGER.

Lemur laniger, Gm., Syst. Nat., i., p. 44, no. 10 (1788).

Microrhynchus laniger, Jourdan, Thèse inaug. Soc. Phys., Grenoble, 1834; Mivart, P. Z. S., 1866, p. 151, pl. xv.

Avahis laniger, Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., p. 325 (with full synonymy), Atlas, pls. 9, 10.

(Plate X.)

Characters.—Fur woolly; the head nearly round; the face short in proportion to the head; muzzle short, covered with hair; the nose and region of the chin hairy; nose-pad on lip large; nostrils opening into a cavity on the upper lip below the skin. Eyes large, the pupil vertical; ears small, concealed in fur. Tail a little longer than the body; body short, stumpy. Third, fourth and fifth fingers flattened; third and fourth toes united by a membrane as far as the first joint.

Cranium more vaulted and the muzzle remarkably shorter than in the genera *Indris* and *Propithecus*; eye-sockets very large; the space between the eyes hollow. Temporal ridges not uniting into a single median ridge. Nasal bones projecting as far as the front end of the very small pre-maxillary bone. Lower jaw remarkably deep and broad behind; line of union of its two halves nearly half the length of the jaw, and in a



THE WOOLLY AVAHI.

straight line with the incisor teeth. Toothless space in front of upper jaw greater than in the other two genera. Dentition of the upper jaw: *incisors* small, the outer larger than the inner, set close to the canines and not at the inner edge of the toothless space; *canines* vertically short; *pre-molars*, with no inner cusp, but having a prominent outer cingulum (a character seen in no other species of Lemur); *molars*, four-cusped. Lower jaw: *incisors* larger than in the two other genera, and less horizontal, the inner ones more slender than the outer. Anterior and posterior *molars*, five-cusped. Hind margin of palate reaching to the middle of the median molar. Central bone of wrist wanting (of all Primates agreeing in this character only with Man, the Chimpanzees, the Gentle- and Sportive-Lemurs and the Endrina); fourth digit of the hands and feet longest. Tail long. The small intestine not spirally coiled upon itself, but folded many times transversely.

Hair long, woolly, dark Mouse-grey at base, reddish-brown in the middle, black at the tips. Face broad, entirely covered with short greyish-brown hairs; nose-pad alone nude. Ears concealed and covered by rufous hair; pupil of eye very contractile, very narrow and linear during the day; across the forehead and over the eyes a transverse lunulate whitish band, margined anteriorly by a black band. Back greyish-brown, the nape darker; a patch over the rump, and the base of the tail and buttocks white, washed with rufous; back and inner side of thighs and round the arms whitish; a narrow fringe on the lower margin of arms and legs ashy-grey, washed with rufous; fore-arm, hands and feet rusty-brown; tail bright dark red, deepest at its extremity. Under side and inner surface of limbs grey, washed with rufous. Length of body, $12\frac{1}{2}$ inches; tail, $15\frac{3}{4}$ inches.

Of this species there are two forms, an *eastern* and a *northern*, the latter being always smaller in size, with the fur lighter and less rusty. In some varieties the upper surface is dark rusty-red all over, and the inner sides of the limbs pure white. Examples from the north-west coast are constantly smaller; the head rounder, and the facial hairs grey; no white band on the forehead; upper surface bright yellowish-brown; tail rusty-grey; under side of hind-limbs pure white, the under surface and inner side of the arms whitish. The variation in coloration is due to the middle part of the hairs, which in typical specimens is rusty-red, but is yellow in the above-mentioned form. Hands and feet grey.

Young.—Ashy-grey, slightly washed with red.

Distribution.—The Woolly Avahi seems to inhabit only the forests of the parallel ranges of the mountains which face the whole eastern coast of Madagascar; it extends round the bay of Passandava on the west coast, opposite to the northern termination of this eastern range of mountains.

Habits.—This species—the smallest of the *Indrisinæ*—being essentially nocturnal, is torpid during the day, and is the wildest and least docile of the family. The first specimen of the "Avahi," the name by which this animal is known among the Anatala tribe, was brought to Europe by Sonnerat, the French traveller, in 1781, and nearly half a century elapsed before a second one was obtained. Since then several specimens have been kept in captivity in the different zoological gardens of Europe.

THE SIFAKAS. GENUS PROPITHECUS.

Propithecus. Bennett, P. Z. S., 1832, p. 20; Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., i., p. 288 (with full synonymy).

The characters which distinguish this genus from *Avahis* and *Indris* are the following : The fur with which they are covered is more silky than woolly, and in general appearance is white, more or less washed with yellow, varying to red or black. The head is very slightly longer than it is broad, with a black and almost naked muzzle ; the ears, half buried in the fur, are flatter and wider than in *Indris*, the inner surface being naked and black, and the outer haired. The nostrils are large and semilunar in shape. The tail is long. The index-finger is not united by a membrane to the others ; their hands and feet are in a much less degree organs of prehension than in most of the other Lemurs.

The skull in proportionate length is intermediate between that of *Avahis* and *Indris*. Compared with *Avahis* it is less vaulted, its muzzle is longer, and the orbits are smaller. The space between the eyes is high, and not depressed, on account of the presence of a large air-cavity in the underlying bone. Their nasal bones do not reach as far forward in front as the level of the incisor teeth. In the dentition of the upper jaw, the incisors protrude somewhat in front, and are dilated laterally in a regular series—thus distinguishing the genus *Propithecus* from *Lemur*,—the inner incisors being larger than the outer ones, with their tips approximating. Between the canine and the anterior pre-molar there is a short gap. The anterior and median molars have the cusps of the crown alternate ; the posterior has them opposite. In the lower jaw the incisors are shorter and stronger than in *Avahis*, and the molars are four-cusped.

The genus *Propithecus* contains three species ; (1) The Diademed Sifaka (*P. diadema*), (2) Verreaux's Sifaka (*P.*

verreauxi), both having numerous very marked varieties; and (3) the Crowned Sifaka (*P. coronatus*).

These species are found all round the coasts of Madagascar; as well in the luxuriant forests on the east side as in the arid deserts and the sparsely-wooded plains of the south-western and western coasts. Of the three species of the genus, one (*P. diadema*) is confined to the eastern and southern coasts, the other two (*P. verreauxi* and *P. coronatus*) are found only on the west coast. More or less distinctly coloured varieties or races of these three species occur, and it is very remarkable that each of them is rigorously restricted to localities distinct from that of the typical species.

I. THE DIADEMED SIFAKA. PROPITHECUS DIADEMA.

Propithecus diadema, Bennett, P. Z. S., 1832, p. 20; Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., p. 296 (with full synonymy), Atlas, pl. 1-3.

Characters.—Fur long, silky, the muzzle naked. Head shorter and rounder than in the other species of the genus; thumb slender, like the toes, set far back, free; great toe very strong, and in the same plane with the other digits; a marked depression exists in the skull behind the orbits. Body, 21 inches; tail, 19 inches in length.

Forehead crossed by a broad white bar; cheeks in front of the ears, and the under side of the chin, white or fulvous white; face black, with a few short black hairs. Back of head, neck, shoulders, sides of body, outer sides of arms, sometimes grey, but generally very dark brown, merging into dark grey on the lower back. Tail at its root washed with orange-yellow, paler in the middle, greyish-white at its extremity. Fore-arm, lower part of arm, sacral region, and external face of hind-limbs, bright

orange-yellow. Hands black-haired to the ends of the fingers, but with long and yellow tufts of hair at the tips. Feet pale orange and haired to the nails. Chest dark brown. Under surface white, or white tinged with yellow, or dark brownish-grey. Internal face of the fore-limbs grey, from the intermixture of black hairs; that of the hind-limbs pale yellow.

Young.—Similar in colour to the adults, but lighter; the frontal band yellow, not white; limbs light yellow.

Varieties.—Several varieties of this species—the “Simpona” of the natives—have been described, of which the following deserve special notice:—

THE SILKY SIFAKA. PROPITHECUS SERICEUS.

Face black, with flesh-coloured spots; the body entirely white, faintly washed with yellow; the base of the tail washed with rust-red. It is of the same size as the type-form, and appears to be only an albino variety. Specimens showing every gradation in coloration between that of the type and the absolute albino are now well known. This form, however, is more or less restricted to the narrow belts of forest on the eastern side of the mountains in the north-east of Madagascar, between the rivers Lokoi and Bemarivo, a region continuous with that inhabited by the typical species.

MILNE-EDWARDS' SIFAKA. PROPITHECUS EDWARDSI.

Differs from the true *P. diadema* in having the face slightly haired between the eyes and on the chin; a patch on each flank rufous-white or orange-yellow, separated by a reddish-black band; a spot at the root of the tail bright rusty-red, and all the rest of body black, washed slightly with rufous. The young are like the parents. This form is also of the

same size as the type, but is a melanistic variety, for a series of specimens show every intermediate shade between that here described and the BLACK SIFAKA (*P. holomelas*), which is of an entirely black colour, and inhabits, as has been shown by MM. Milne-Edwards and Grandidier, the same region as *P. edwardsi*.

Distribution.—The typical form of the species is confined to the extended region on the east coast of Madagascar lying between the Bay of Antongil on the north, and the River Masora in the south, in the forest-belts on the eastern aspect of the mountains, where rain falls abundantly and the whole region is covered with luxuriant vegetation. Its melanistic variety (*P. edwardsi*) extends south from the Masora as far as the Faraouny river, but it ranges to higher and colder altitudes on the mountains; while its albinistic variety (*P. sericeus*) lives in the somewhat warmer region to the north of Antongil Bay, each being, to south and north respectively, conterminous with the central habitat of the typical form.

II. VERREAUX'S SIFAKA. PROPITHECUS VERREAUXI.

Propithecus verreauxi, Grandid., Album de l'île de la Réunion, iv., pp. 153-162, pls. 1, 2 (1867); Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., i., p. 305 (with full synonymy), Atlas, pls. 4, 6, 8.

Characters.—Fur short and woolly; face entirely naked; head longer than broad; a well-marked swelling of the skull between the eyes; the upper incisors sub-equal. Smaller and more robust than *P. diadema*, the head longer, the hair on the limbs shorter, the tail longer.

Body yellowish-white ; a spot on the top of the head dark brown, sometimes washed with rufous, separated from the face by a white frontal bar. Face black ; eyes brownish-yellow ; interior of ears black, and naked ; a grey patch on the middle of the back ; outer aspect of the fore-arms, and hind-legs, ashy-grey ; rest of the body white. Hands and feet white. Tail yellowish-white. Length of body, 18 inches ; of tail, 22 inches.

Young.—Entirely white, with a dark brown spot on the head ; the under surface of the body washed with rufous.

Varieties.—Two well-marked varieties of this species are known, both of which were for many years considered to be distinct species. Continued exploration has, however, now resulted in the accumulation in various museums of a large amount of material from many localities, and this proves that the two forms really belong to but one species.

VON DER DECKEN'S SIFAKA. PROPITHECUS DECKENI.

Differs from the true *P. verreauxi* in having the face and ears black, and the body otherwise entirely grey, or white, washed more or less with yellow (sometimes rufous on the limbs) ; or of an ashy-grey colour on the loins, neck, and outer aspect of the limbs ; the under side bright rufous ; chest and inner sides of the limbs rusty-white, with a fulvous spot at the base of the tail. Specimens from the forests of the interior have a grey spot on the back of the neck expanding into a collar, which is absent in those from the coast. An albino variety comes, so far as is at present known, only from the wooded belts on the extensive plains between the rivers Manambolo and Manjaray, on the west coast.

COQUEREL'S SIFAKA. PROPITHECUS COQUERELI.

(Plate XI.)

Has the face naked and black, but the centre of the nose white; the ears showing as black points amid the white hair; head and back of neck white, slightly washed with yellow; outer side of arm and fore-arm dark maroon-red, the lower border fringed with long white hair; a maroon patch on the upper and outer surface of the thighs, lighter on the chest and central part of the belly. Loins dark rusty-grey; hands white; tail rusty-grey.

Distribution.—Verreaux's Sifaka, with its two varieties, is confined to the small thin woods on the sandy and almost rain-less plains along the western and southern coasts of Madagascar. The type-form is found, alone, and unassociated, in the extensive plains of Mesozoic geological formation—between the southern base of the eastern range of mountains and the River Tsidsubon, which flows into the sea on the west coast. Von der Decken's Sifaka inhabits the middle of the west coast, while Coquerel's Sifaka has its home further to the north. It occupies the area between the south side of Narendry Bay and the north side of Bembatoka Bay, the Betsiboka River being its extreme southern limit.

Though first observed by Flacourt, and described by him in 1661, Verreaux's Sifaka remained practically unknown from that time till re-discovered by M. Grandidier in 1867.

III. THE CROWNED SIFAKA. PROPITHECUS CORONATUS.

Propithecus coronatus, Milne-Edwards, Rev. Scient., 1871, p. 224; id. et Grandid., Hist. Nat. Madag., Mamm., i., p. 316 (with full synonymy), Atlas, pl. 7.



COQUEREL'S SIFAKA.

Characters.—Muzzle very broad and naked ; nose-pad wide ; inside of ears naked. Face, top of head, sides of neck, and throat, deep brownish-black ; muzzle black ; a band across the temples, and a streak down the nose, white. Ears black inside, fringed externally with white ; neck and upper surface white, washed with rust-colour on the limbs and root of the tail. Tail, hands, and feet, pure white. Under side rich orange-red, darker across the chest ; inside of limbs white, washed with rufous. Of the same size as *P. verreauxi*.

Cranium larger in all its parts than in other species. Nasal bones elongated beyond the incisor teeth ; nose very flat, this being due to the large air-cavity (called false nose) in the jaw-bone below, connected with the nose. The length and breadth of the muzzle gives a peculiar expression to the face of *P. coronatus*.

This species, like the preceding, is subject to considerable variation.

The whole head is sometimes grey, washed with rufous ; the upper surface and root of the tail white, flushed with rust-colour.

In examples living further in the interior than the habitat of the type (Bay of Bembatoka), the back is more rufous, the neck has a large grey or brown patch, and the chest is very dark brownish rust-colour. The abdomen and the inner sides of the limbs are bright red.

Distribution.—This species occurs on the north-west coast of Madagascar, between the Bay of Mozamba to the north and the River Manjaray on the south, ranging over the country to a considerable distance into the interior. The lighter-coloured specimens come from the more northern range of the species, while the more brightly-marked varieties have been obtained

in the interior more to the south. It is curious, remarks M. Grandidier, to find races and species of the same genus so exactly restricted, that one has only to cross a river, not necessarily large, in order to obtain on one bank certain species of *Propithecus*, whereas those occurring on the opposite bank may be of a very distinct species or race. To what influence in their surroundings can all these variations be ascribed? One can understand that species inhabiting a wooded and humid country, or living among granitic mountains (as *P. diadema* does), would differ in size and fur from other members of the same genus which live in dry and arid plains (as in the case of *P. verreauxi*); but how can the great variations that occur in members of the same species living a few miles, and perhaps only a few metres, apart, be explained, when the external conditions are almost the same?

Habits.—The habits of the different species of Sifaka are very similar. They live in companies of six or eight, and are very gentle and inoffensive animals, wearing always a most melancholy expression, and, as a rule, being morose, inactive, and more silent than other Lemurs. They rarely live long in captivity. In their native state they are most alert in the morning and evening, as during the heat of the day they conceal themselves amid the foliage of the trees. When asleep or in repose, the head is dropped on the chest and buried between the arms, the tail rolled up on itself and disposed between the hind-legs. The Sifakas live exclusively on vegetable substances—leaves, fruits and flowers—their diet not being varied, as in the other groups, by small birds, eggs, or insects. Their life is almost entirely arboreal, for which the muscles of their hands and feet, as well as the parachute-like fold of skin between their arms and body, and their peculiarly hook-like

fingers, are most fitted. The young one is carried about by its mother on her back, its hands grasping her arm-pits tightly. The Sifakas are held in great veneration or fear by the natives of Madagascar, and are never intentionally killed by them.

THE ENDRINAS. GENUS INDRIS.

Indris, Cuv. et Geoffr., Mag. Encycl., 2 ed. Ann. i., p. 46 (1796); Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., i., p. 330 (with full synonymy).

This genus is, like the first of the sub-family, monotypic, no second species having rewarded the many explorers of Madagascar in the long period that has elapsed since its solitary species was discovered. This species is known as

I. THE ENDRINA. INDRIS BREVICAUDATUS.

Indris brevicaudatus, Geoffr., Mag. Encycl., 2 ed. Ann., p. 46 (1796).

Indris variegatus, Gray, Ann. and Mag. N. H. (4), x., p., 474 (1872).

Indris brevicaudatus, Milne-Edwards and Grandid., Hist. Nat. Madag., Mamm., i., p. 336 (with full synonymy), Atlas, pls. xi.-xii.

(Plate XII.)

Characters.—The peculiar features of the species, as given below, are necessarily those of the genus also.

Fur long and woolly, extremely variable in its coloration. Head rounded, longer than it is broad; muzzle moderately long, covered with very short hairs; fingers and toes haired to the finger-tips; external ears rounded, exerted, and more developed than in *Avalis* or *Propithecus*, with long and tufted

hair forming a fringe all round. Median nose-pad high and narrow; pupil of eye circular; body elongated; arms about one quarter of the length of the legs; hands very long, the four outer fingers united by a membrane as far as the first joint, and the toes to the centre of their middle segments; hands and feet haired to the tips. Tail rudimentary.

Skull longer and less vaulted; brain-case proportionately more compressed from side to side; the muzzle longer, and the orbit smaller, than in *Avahis*; floor of orbit higher than the bony margin of the jaw; inter-orbital space flat; nasal bones, though long, not extending in front as far as the end of the pre-maxillary bone; mandible elongated, narrower, and less deep than in *Avahis*. Bony palate short, posterior margin thickened, and with a foramen behind the posterior molar; line of union of the two halves of the lower jaw shorter than in *Avahis*; its angle very large. No central bone in the wrist (or *carpus*); hind-limb (with or without the foot), compared with the fore-limb (with or without the hand), longer than in any other of the Primates, except *Galago*. *Upper teeth*: Incisors, sub-equal, set close together and subject to variation in size; canine, vertically taller than, and not separated by a gap from, the pre-molar; pre-molars compressed, and having an inner cusp; anterior molars, four-cusped, with the supplementary cusps weak, and with no oblique ridge; anterior and median, with their outer and inner cusps opposite; posterior molar, which is the smallest grinder of the jaw—four-cusped, with transverse, but no oblique ridges. *Lower teeth*: Incisors, with marked longitudinal ridges to the outside (peculiar to this genus); pre-molars sub-equal; molars all four-cusped, and the posterior ones expanded behind.

Brain highly organised. A large laryngeal pouch (present



THE ENDRINA.

also in the fœtus), but differing from that of the Apes, is placed between the gullet and windpipe, communicating with the latter by an orifice: main arteries of the fore- and hind-limbs not broken up into a *rete mirabile* of small parallel vessels, as in many species of Lemurs.

Face naked, sometimes blackish, generally dark grey; lips downy; head, neck, back, shoulders, arms, and hands, deep black; fore-arms faintly washed with rufous; a large patch, widening from the middle of the back downwards to the lower back, rump, and root of the tail pure white, washed with orange or red; a patch on each flank, pale, becoming rufous or greyish-white, separated from the rump-spot by black bands continuing down the outer side of the inner face of the thighs, and the front and inner sides of the legs; thighs ashy-grey, their upper two-thirds greyish, becoming black on the front, and ashy-grey on the hinder surface, of the leg. Feet black; tail stumpy, fawn-colour, brownish-grey at the tip; under side rusty brown; abdomen grey; heel rufous.

Many varieties of this species have been met with. Of these, some have the top of the head and between the eyes greyish-white, mixed here and there with black; jaws and throat, grey; ears, neck, back and upper part of arms, black; the fore-arms grey; the hands black; a patch on the lower back ashy-grey; flanks bright rufous; legs grey; band on front of the thighs black; heel bright rufous.

Other examples have a mark over each eyebrow, the fore-limbs nearly to the hands, the hinder part of the thighs, the legs from the knee to the ankle, and the whole under side iron-grey; the ankles and hind part of the heels white, yellow below. (*Indris variegatus*, Gray.)

All stages between the forms here described and complete

albinos are known ; so that the various differences observed prove them to be only individual variations of the same species.

Distribution.—The *Endrina* is confined to the woods looking eastward, on the two high ranges along the eastern coast, between the Bay of Antongil on the north and the River Masora on the south.

Habits.—The “*Endrina*,” “*Bàbakòto*,” or “*Amboanala*” (Dog of the Forest), as the natives variously name this species, has the same habits as the *Sifakas*. It is the largest of the Lemurs, and is diurnal. It derives its appellation of “Dog of the Forest” from the doleful, dog-like howls which it utters. In this habit it differs, therefore, from most of the other groups (except the True Lemurs), which are, as a rule, rather silent. Its powerful voice is due to the distensible resonator which it possesses in its laryngeal pouch, described above. Essentially diurnal, the *Endrinas* live in small companies, and feed only on vegetable diet. The hook-like fingers of their hands are better adapted for climbing than for prehension, and much of their food is, indeed, seized by the mouth. They are entirely arboreal, and move about the trees in an erect position, rarely coming to the ground. The “*Bàbakòto*” is held in great veneration by most of the native tribes.

M. Pollen gives several other particulars of these Lemurs, and of the curious notions of the Malagasy respecting them. Their native name is “*Bàbakòto*,” literally “Father-child” (or “boy”), not “*Indri*,” as stated by Sonnerat, who discovered the species. *Indri*, or *Indry*, is a Malagasy word meaning “lo !” or “behold !” and was probably mistaken by him and other Europeans for the vernacular name of the animal when the

natives exclaimed, "Indry izy !" ("There he is !"). Dr. A. Vinson says that, in passing through the great Eastern forest, he was assailed for two days by the incessant clamour of these Lemurs, which seem to keep together in large companies, but are invisible in the dense foliage. The natives have a superstitious veneration for these animals, and consider them as sacred. They believe that their ancestors change after death into *Bàbakòto*, and that the trees where these animals live supply infallible remedies against otherwise incurable diseases. The people say that it is very dangerous to kill these Lemurs with spears, because if a spear is hurled against one of them it seizes the spear in its flight without being itself hurt, and in its turn stabs with certain aim those attacking it. They also relate that when the female has borne a young one, she takes the little creature in her arms and tosses it to her mate, who is seated on a neighbouring tree, and that he throws it back to the female. If the little one does not fall to the ground after being subjected to this exercise for a dozen times, the parents bring it up with the greatest care ; but, if the contrary event happens, they abandon it, not even troubling to pick it up. In certain parts of Madagascar, says M. Pollen, the people employ the *Bàbakòto* in chasing birds, and they say that it renders as good service as a Dog. These animals, although principally fruit-eaters, do not disdain small birds, which they catch with much skill, in order to eat their brains.

This Lemuroid is probably the best known to travellers in Madagascar, at least by ear, as no one can travel along the most frequented route in the island, that from Tamatave to Antananarivo, without often hearing the cries of these animals as he passes through the great forest. They are not often seen, but their long drawn-out melancholy cries are frequently heard, a

strange wailing sound, as if of people in distress, or children crying. Dr. Vinson says that the Bètanimèna tribe let these animals at liberty if they find them in captivity, and give them burial should they find them dead. They relate that a certain tribe, at war with its neighbours, took refuge in the forests; their enemies, in pursuing them, led by the sound of human voices, as they supposed, found before them a troop of *Bàbakòto*, at whose appearance they were struck with terror. They fled, persuaded that the fugitives had been changed into beasts. These, on the other hand, vowed eternal gratitude to the Lemurs who had saved them, and have ever since religiously refrained from injuring them in any way.

EXTINCT LEMUROIDEA.

On a former page (*anteà*, p. 13), attention was drawn to the interrupted distribution of the Lemurs, and to their present restricted range to the tropical and sub-tropical regions of Africa, of Madagascar, and of part of the mainland and of the islands of the Asiatic continent. In times geologically not very remote, they were inhabitants of both worlds.

The earliest appearance of the Primates in time is at the beginning of the Tertiary period. Lemuroids, some of them of a more or less primitive type, then lived in Europe in the Lower Eocene period. In the higher beds of the same epoch (to which the fresh-water deposits of the London clay of England, the Plastic clay of France, and the prolific Wasatch beds of Wyoming, Utah, and Colorado of America belong) undoubted Lemurs are represented by many genera, which in the Middle Eocene attained to a great development.

In the Upper Eocene of Europe many distinctively Lemu-

roid genera (*Adapis*, *Microcherus*, &c.) "formed," as Zittel remarks, "a very characteristic element of the fauna; they are connected with old Tertiary fore-runners, and combine features of the existing Lemurs and true Apes." The presence of these heat-loving animals in such northern latitudes undoubtedly indicates the existence there of a climate more genial at that epoch than now. In the corresponding period in North America remains have been less plentifully found; but for the most part the genera are representatives of those of the European beds.

In strata of Oligocene and older Miocene age no Lemuroid remains have come to light in Europe, and they are represented by only one or two doubtful forms in America. After that date they apparently vanished from the New World and from the northern portions of the Old.

Many of these extinct Lemuroids so combine the characters of the *Insectivora* and the *Ungulata* (or hoofed animals), with those of their own Sub-order, that it is often extremely difficult, even impossible, sometimes, to determine to which Order they really belong, owing to a blending of characters due to their common origin. The Upper Eocene forms present many affinities with the South American Capuchin Monkeys (*Cebidæ*). Dr. Forsyth Major is of opinion, however, that they are more highly, and not (as is generally believed) less specialised than those now living, which appear to have been the subject of retrogressive development.

The species to be noticed below are some of the more important of those which have been ascertained to belong to the present Sub-order.

No remains assignable with certainty to the families *Chiro-myidæ* or *Tarsiidæ*, have as yet been discovered. The first form

to be mentioned belongs to a family which has now no living representatives.

FAMILY MEGALADAPIDÆ.

This family has recently been established by Dr. Forsyth Major, for a fossil species represented by the greater portion of a large cranium and part of its lower jaw, found in a marsh at Amboulisatra, on the south-west coast of Madagascar. This species is the only representative of the single genus of the family.

GENUS MEGALADAPIS.

Megaladapis, Forsyth Major, Phil. Trans., vol. 185 B, p. 15 (1894).

The cranium, about 10 inches long, indicates an aged animal three or four times as long as the common Cat, which is an enormous size as compared with any living Lemur. Brain-case straight, narrow, short, low, and situated at a higher level than the facial region; an enormous lateral development of the region between the eyes; orbits small in diameter, communicating freely with the temporal fossa, protruding outwards and forwards, and surrounded by a thickened ring; facial region elongate and bent upward; palate convex downwards from front to back; ridges for attachment of the temporal muscles uniting in a great central crest; frontal bones constricted behind the orbits; maxillary bones behind the molar teeth greatly inflated by air-cavities; the two halves of the lower jaw ossified together. In the upper jaw the pre-molars have one outer and one inner cusp, and the molars one internal and two external cusps, the former being deeply separated from the hind outer cusp, and joined by a ridge to the front outer cusp. In the lower

jaw, the posterior pre-molar has one outer cusp, a fore and hind inner cusp (each joined by a crescent to the outer cusp), and a central inner cusp; the three molars have two outer and three alternating inner cusps, and to the outer side a basal cingulum; the posterior molar has a strongly cusped heel.

MEGALADAPIS MADAGASCARIENSIS, Forsyth Major, the only species of the genus, presents many marsupial and insectivorous characters and features which show some approach towards the South-American Howlers (*Alouatta*), a specialisation "not in the least," according to Dr. Major, "implying a near relationship, but probably only an adaptation to a corresponding function" implied in the "vocal organs of unusual size," which, he believes, *Megaladapis* to have possessed. Lemurine characters, however, predominate. In the shape of its molars it is related to *Lepidolemur*, and still more closely to *Microcebus* and *Chirogale*, while by the characters of its inter-orbital region it approaches to the Sifakas (*Propithecus*) and the extinct *Adapis*.

The small diameter of its orbits suggests, according to Dr. Major, that in habits this extinct giant Lemur was diurnal; and from the conformation of its lower jaw "there exists," continues the same distinguished investigator, "a strong assumption that, as in *Alouatta*, it was provided with vocal organs of unusual size.

The age of this Howling Lemur, estimated either geologically or by years, cannot be of very great antiquity. Its remains were found associated with those of the giant Moa-like bird, the *Æpyornis*, of Tortoises and Hippopotami, all now extinct, and of Crocodiles still living in the interior lakes of the island. Some of these animals were certainly contem-

poraneous with the now vanished Dodo and the large flightless Rail (*Aphanapteryx*), both of which were seen alive by Europeans little more than two centuries ago, and it is not improbable that *Megaladapis* may have been living in the Madagascar forests at the same period.

FAMILY LEMURIDÆ (*anted*, p. 22).

In this family, and in its sub-family *Lemurinae* (because of its affinities with *Hapalemur*), has to be included a large extinct species from Nossi Vey, in North-west Madagascar. Its fossil remains were recently described (P. Z. S., 1893, p. 532), but not named by Dr. Forsyth Major. They will prove, he believes, when more fully known, to be the type of a new genus. At present, however, owing to their incomplete state, it is not possible to describe the species fully. "The Lemuroid nature of the specimen is at once demonstrated by the great elevation and downward bending of the post-orbital processes . . . showing that the osseous ring of the orbit was complete. Unusual for a Lemuroid is the very strong post-orbital constriction of the frontals, a character, however, seen in *Adapis*, an Eocene European form, and in *Hapalemur*. With the latter it agrees in the voluminous cranial and very short facial portion, and the "cuttingly sharp" inferior margin of its post-orbital process. Seen from the side, this fossil cranium is almost vertically truncated behind, as in the skull of *Alouatta*. The region between the eyes is vaulted by underlying air-chambers.

FAMILY ANAPTOMORPHIDÆ.

This family includes certain fossil forms of Lower Eocene age from the phosphatic deposits of Quercy in France, the

Wasatch strata of Wyoming, and the Puerco beds in New Mexico. Their dental formula is the same as that of existing Lemurs, namely I_{2-1}^2 , C_{1-0}^1 , P_{2-3}^{2-3} , M_3^3 . In some of the genera there is a tendency to develop, as Cope has pointed out, large cutting teeth in the position of incisors, "thus approaching the Aye-Aye." The posterior pre-molars are more simple than the anterior true molar, a character which indicates some relationship to the Mouse-Lemurs (*Chirogale*). The mastoidal or posterior portion of the ear-capsules, and the neighbouring squamosal region of the cranium are swollen, as among the Galagos.

GENUS MICROCHÆRUS.

Microchærus, Wood, Lond. Geol. Journ., i., p. 5 (1846).

Heterohyus, Gerv., Zool. et Pal. Fr., p. 202, pl. 35, fig. 14.

Necrolemur, Filhol, C. R., lxxxvii., p. 1112 (1873); id. Ann. Sc. Geol., viii., p. 55, pl. iv., figs. 213-217 (1877).

This genus is distinguished from all other Lemurs by "the angle of the mandible being produced into a large hook-like flange." (Flower and Lydekker.) The orbits are large, indicating a nocturnal animal; the inter-orbital space is wide, and distinguishes it from *Loris*. The dental formula is I_1^2 , C_1^1 , P_3^3 , M_3^3 . The canine teeth are not prominent; the anterior lower pre-molar is only slightly developed; a gap separates the anterior and the median upper pre-molars.

This genus is represented by five species. MICROCHÆRUS ANTIQUUS (Filhol) is of very small size, and has many affinities with *Galago*, as exhibited in the well-preserved cranium that has been recovered from the Phosphorites of Central France. The two lower molars have only one root. M. ERINACEUS,

Wood, from the Upper Eocene of Hampshire; *M. EDWARDSI* (Filhol), from Central France, a species larger than *M. antiquus*, presents dental characters similar to the Galagos and the Mouse-Lemurs; *M. PARVULUS* (Filhol), and *M. ZITTELI* (Schlosser), are both from the Quercy Phosphorites of France; while *M. ARMATUS* is from the Eocene of Alsace, and *M. (CRYPTO-PITHECUS) SIDEROLITHICUS* from the Bonerg of Frohnstellen.

GENUS MIXODECTES.

Mixodectes, Cope, Proc. Amer. Phil. Soc., p. 447 (1883); id., Rep. U. S. Geol. Surv., iii., p. 240, pl. xxiv. f, figs. 1 and 2.

The members of this genus, founded on fragmentary mandibles from the Puerco (Lower Eocene) strata of New Mexico, have a large front tooth "issuing from the ramus at the symphysis like a rodent incisor, the second tooth being similar but smaller and posterior and external to the first." The genus is represented by two species, *M. PUNGENS*, Cope, and *M. CRASSIUSCULUS*, Cope.

GENUS CYNODONTOMYS.

Cynodontomys, Cope, Palæont. Bull., p. 151 (1882); id., Rep. U. S. Geol. Surv., iii., p. 243, pl. xxiv., fig. 2.

This genus contains but one species, founded on several lower jaws disinterred from the Wasatch beds in the Big-Horn Bad-lands, in Northern Wyoming. The lower incisors, or perhaps, canines, are very large and close to the line of union of the two halves of the jaw; the molars have three cusps in front and a heel behind. The dental characters of the genus "resemble considerably those of *Anaptomorphus* and *Necrolemur* [*Microchærus*], but the large size of the inferior canine

or incisor tooth distinguishes it from both." (Cope.) *C. LATIDENS*, Cope, is the only species.

GENUS OMOMYS.

Omomys, Leidy, Journ. Acad. Nat. Sci. Philad., vii., p. 408 (1869).

This genus was established for the first Mammalian fossil—a lower jaw—described from the Bridger-beds as *O. CARTERI*. The posterior lower molar has cusps in opposing pairs; pre-molars, three in number, the two anterior one-cusped, the posterior two-cusped. The chin was longer and less rounded than in *Anaptomorphus*.

GENUS ANAPTOMORPHUS.

Anaptomorphus, Cope, Proc. Amer. Phil. Soc., 1872, p. 554; id., Rep. U. S. Geol. Surv., iii., p. 245, pl. xxiv. c, fig. 1; xxv., fig. 10.

This genus was founded by Cope on an almost entire cranium discovered in the Bridger (Eocene) beds of the upper Valley of Green river, and on other remains from what is known as the Wasatch formation of the Big-Horn Basin in Wyoming Territory, in North America. The external upper incisor is small and set close to the small canine; the pre-molars have each a large external and a smaller internal cusp; the true molars are wide and have one internal and two external cusps. In the lower jaw the two anterior molars are four-cusped, with a transverse ridge between the anterior pair, and an oblique ridge between the hind inner, and the front outer, cusp; the posterior is three-cusped and has a heel. The orbits are enclosed, as in typical Lemurs. Not less typical characters are the position of the lachrymal foramen, external to the orbit, and the unossified halves of the lower jaw. "Its dental formula ($I\frac{3}{2}$,

C_1^1 , P_2^2 , M_3^3) agrees only with the *Indrisinæ*. But no known *Lemuridæ* possess anterior lobes and cusps on all the pre-molars, so that in this respect, as in the number of its teeth, this genus resembles the higher Monkeys, the *Simiidae* and *Hominidae*, more than any existing member of the family. . . . It has . . . a number of resemblances to *Tarsius*, which is, perhaps, its nearest ally among the Lemurs, although that genus has three pre-molars. . . . There is no doubt but that the genus *Anaptomorphus* is the most Simian Lemur yet discovered. . . ." (Cope.)

The species included in this genus are *A. ÆMULUS* (Cope), which did not exceed the size of a Marmoset or a Red Squirrel, and had short erect incisors; *A. HOMUNCULUS* (Cope), a species founded on a cranium without a lower jaw, with the orbits not so large as in *Tarsius*, and the skull wide behind the eyes. "The *A. homunculus* was nocturnal in its habits," according to Professor Cope, "and its food was like that of the smaller Lemurs of Madagascar and the Malayan islands. Its size is a little less than that of the *Tarsius tarsius*."

Two other insufficiently characterised genera, both considered to be primitive Lemuroids, are *Plesiadapis*, Gervais, containing the species *P. REMENSIS*, *P. GERVAISI*, *P. TOURNESARTI*, and *P. DAUBREI*, from the Lower Eocene strata of Rheims, which have five-cusped lower molars, and enlarged upper and lower incisors; and *Protoadapis*, Lemoine, with one or two high front cusps, and a low heel to its three pre-molars; the anterior molars with two pairs of opposite cusps, the posterior molar with a fifth cusp on the hind border. *P. CRASSICUSPIDENS*, Lemoine, and *P. RECTICUSPIDENS*, Lemoine, are its two species.

FAMILY ADAPIDÆ.

The different species associated together under this family are abundantly known from the Upper Eocene of France, England, and North America. They are remarkable in having an extra pre-molar in both jaws, the dental formula being $I_{\frac{2}{2}}, C_{\frac{1}{1}}, P_{\frac{4}{4}}, M_{\frac{3}{3}}$.

GENUS ADAPIS.

Adapis, Cuvier, Ossem. Foss. (2) iii., p. 265 (1822); Flower, Ann. and Mag. N. H., xvii., (1876), p. 323.

Palæolemur, Delfort., Act. de la Soc. Linn. Bord., xxix., pp. 87-95, pl. 5 (1873); id. C. R., lxxvii., p. 64 (1873).

Aphelotherium, Gervais, Zool. et Pal. Franç. (1), ii., Exp. 34 (1848-52).

Cænopithecus, Rütim, Denksch. Schw. Ges. Nat., xix., p. 88 (1862).

Notharctus, Leidy, Geol. Surv. Mont., p. 364 (1871).

? *Thinolestes*, Marsh, Am. Jour. Sci., 1872 (2), p. 205.

? *Telmalestes*, Marsh, *op. cit.*, p. 206.

“The general form of the cranium,” to quote Sir W. Flower, “the large size and anterior direction of the orbits, the small and narrow muzzle . . . show its affinity to the Lemurine animals, and especially to the African forms. The whole skull, however, is more depressed than in the slow Lemurs and Galagos; the orbits are smaller, the brain cavity relatively smaller and more constricted behind the orbits, and the muscular ridges more developed.” . . . The lower jaw is deep and stout. The posterior upper pre-molar is very similar to a true molar. “The upper molar teeth are nearly equal in size, and have nearly square crowns, with four distinct cusps, one at each angle, rather obliquely placed”; the hind inner cusp

of the posterior molar inconspicuous. The lower molars have two pairs of obliquely placed cusps, connected by transverse ridges, anterior and posterior, with an oblique ridge running forwards and inwards from the outer hind cusp. The hindmost lower pre-molar has an internal cusp; the lower incisors have upright spatulate crowns like those of true Apes.

Several species of this genus have been described. *ADAPIS PARISIENSIS* (with the synonyms of *Aphelotherium duvernoyi*, Gervais, and *Palaeolemur betillei*, Delfortrie) is one of the best known, and its remains have been found in Upper Eocene strata at Egerkingen, in Switzerland, at Sainte Néboule de Béduer, and in the Paris Gypsum, in France, as well as in England. It "more nearly resembles the Indo-African Lemurs, and not those of the island of Madagascar, or of the extreme east, having no near relationship with the *Tarsius*, the Aye-Aye, or the Indris, and not much with the true Lemurs." (*Flower.*) From the Eocene of Switzerland comes *A. LEMUROIDES*. *ADAPIS MAGNA* (Filhol) is larger than the preceding species, has a larger face, and a greater constriction between the cerebral and facial regions of the skull. It has been found in the phosphatic deposits at Raynal, in France. *ADAPIS ANGUSTIDENS* (Filhol), from the Quercy Phosphates of France, is distinguished by the structure of its molars, and by the great size of its two anterior pre-molars. *A. TENEBROSUS* (Leidy) has a large lower canine. *A. MINOR* (Filhol) is an additional species.

GENUS TOMITHERIUM.

Tomitherium, Cope, Vert. Bridg. Eoc. Wyom., p. 2, 1872.

Limnotherium, Marsh, Am. Journ., Sci., 1871, ii., p. 43 (in part).

This genus, which is allied to *Adapis*, is characterised by

having its lower incisors with cutting edges ; the first and second lower pre-molars with one root ; the third with one cusp and a posterior heel, and the fourth an interior lateral cusp in addition. The lower true molars have two anterior cusps (the inner being double) and two posterior. The thigh is long and the knee free from the body as in the *Anthropoidea*, the hand capable of turning freely upwards at the wrist ; the hind-limbs longer than the fore-, and “the details of the lower jaw, which is co-ossified in the centre, and teeth similar to that of the lower Monkeys.” The remains of the only known species, *T. ROSTRATUM* (Cope), which was about the size of the Capuchin Monkey (*Cebus capucinus*) of Brazil, were found in the Bridger (Eocene) beds in an isolated spot on Blacks’ fork, Wyoming.

GENUS MENOTHERIUM.

Menotherium, Cope, Bull. U. S. Geol. Surv. Territ., 1874, i., p. 22.

Laopithecus, Marsh, Am. Journ. Sci., 1875, i., p. 240.

This genus was established on an under jaw from the Lower Miocene White-river beds of Nebraska. Its molars are successively larger from anterior to posterior ; the two pairs of cusps are obliquely opposite, the hinder pair longer than the front pair, and presenting a strong cingulum. Its discovery was the first indication of Lemurs in the Miocene of the United States. *M. ROBUSTUM*, Marsh, was as large as a Coati ; and *M. LEMURINUM* (Cope) about the size of a domestic Cat.

GENUS PELYCODUS.

Pelycodus, Cope, Cat. Verteb. Eoc. New Mex., p. 13 (1875).

Tomitherium, Cope, Rep. U. S. Geol. Surv. W. of 100° mer., ii., p. 135 (in part).

Lemuravus, Marsh, Amer. Journ. Sci., 1875, i., p. 239.

This genus is characterised by the second pre-molar having always two roots ; the anterior has one root and the third three ; the posterior has one external and one internal cusp. Of the true molars, all have two external cusps ; the anterior and median have two internal cusps and the posterior has only one ; of the lower teeth the posterior pre-molar has an internal cusp and a heel ; the next one has no internal cusp ; the molars often have the fore inner cusps double ; the posterior molar has a strong heel. This genus contains three species, all described by Cope (*P. JARROVII*, *P. TUTUS*, *P. FRUGIVORUS*), with the hind inner cusp of the upper molars distinct from the heel ; and *P. ANGULATUS*, in which that cusp is small and is on the heel. Their remains have been found in the Lower Eocene (Wasatch) beds of New Mexico. *P. HELVETICUS* has been described from the Upper Eocene of Egerkingen.

GENUS MICROSYPUS.

Microsyops, Leidy, Proc. Acad. Nat. Sci., Philad., 1872, p. 20.
Linnotherium, Marsh, Amer. Journ. Sci., 1871, ii., p. 43 (in part).

This genus is easily distinguished, as Cope points out in his sumptuously illustrated "Vertebrata of the Tertiary Formations of the West," . . . by the absence of the first (anterior) inferior pre-molar, and probably of the superior first pre-molar also. The canine tooth of the lower jaw is very large. The posterior pre-molar has an internal cusp, and the molars two front inner cusps. There are three species, distinguished chiefly by size, *M. SPIERIANUS* (Cope), very small ; *M. ELEGANS* (Marsh), the largest, with seven teeth succeeding the canine in the lower jaw ; and *M. SCOTTIANUS* (Cope) ; all from the Eocene of Wyoming.

GENUS HYOPSODUS.

Hyopsodus, Leidy, Proc. Acad. Nat. Sci., Philad., 1870, p. 109.

The present genus is recognised by the front inner cusp of the lower molars being single, and their heel presenting a cusp at its inner hind angle (except in *H. acolytus*). Of the upper premolars, the median and posterior have an internal cusp; and the molars have two outer and two inner cusps with two small intermediate tubercles. There are six species known, from the Wasatch and Bridger beds of Wyoming and New Mexico, of which *H. ACOLYTUS* is distinguished by having the heel of the anterior and median lower molars without an inner hind cusp. Professor Cope remarks that though the species of this genus are not numerous, individuals of some of them are exceedingly common in the Eocene beds of Wyoming. *H. PAULUS* and *H. MINUSCULUS*, Leidy, *H. VICARIUS* and *H. POWELLIANUS*, Cope, with *H. JURENSIS*, Rutimeyer, from the Upper Eocene of Egerkingen, are the best known species.

The genera *INDRODON*, Cope, from the Lower Eocene Puerco formation of New Mexico, with three cusped upper and four cusped lower molars; *OPISTHOTOMUS*, *APHELISCUS*, and *SARCOLEMUR*, Cope, from the Wasatch of Wyoming; *HIPPOSYUS*, Leidy; *BATHRODON*, *MESACODON*, and *STENACODON*, Marsh, from the Middle Eocene Bridger beds; are of doubtful affinities.

II. THE MONKEYS AND APES—SUB-ORDER ANTHROPOIDEA.

This Sub-order, though containing animals of much higher organisation than the *Lemuroidea*, embraces species presenting many different grades of intelligence, and ranging in size from the Pigmy Marmoset, not larger than a small Kitten, to the

ponderous Gorilla and the genus *Homo*. In external characters the Monkeys and Apes have in general a shorter and less Dog-like nose than the Lemurs, thin lips and a more distinct face ; while their eyes, situated on the face, are invariably directed forwards, and never outwards, or to the side. The opening of their nostrils is either outward (as in those inhabiting the New World), or downwards (as in the bulk of the Old World species). All of them are covered with hair ; the tail may be long, short, or wanting. The proportions of the fore-limbs to the hind- vary much in the different groups. The great toe, as well as the thumb, is (except in a few species) fully opposable, so that in the majority of members of the Sub-order, the foot is as good a prehensile organ as the hand. From this circumstance comes the designation, *Quadrumana*, or "four-handed," so often applied to these animals. In a few species the thumb is rudimentary or absent, but the fore-finger, the absence of which characterised some of the Lemurs, is always present and well developed, and the corresponding digit in the foot (except in the Marmosets) has a flat nail instead of a claw. The mammæ of the *Anthropoidea* are always situated on the breast. If we examine the structures underlying the skin, we find that in the skull the orbits are entirely shut in by a bony wall, so that the finger cannot be passed into the temporal depression behind, as could be done in the Lemurine skull, and that the lachrymal foramen opens within the cavity for the eye. In the present Sub-order there is no toothless space in the mid-line of the upper jaw, the incisor teeth being set close together ; but there is always a vacancy, except in Man, between the incisors and the canine tooth. The lower canine teeth do not resemble in form the incisors, nor do they protrude horizontally, as in the Lemurs.

The two halves of the lower jaw are always co-ossified together, when the animal is full grown. The *humerus*, or arm-bone, never has an entepicondylar foramen on the inner side of its lower portion, and the bones of the fore-arm (the *ulna* and *radius*) are never ossified together, nor are those of the lower leg (the *tibia* and *fibula*); so that there is perfect freedom for every movement necessary for grasping and walking, or for rotating the hand or foot on the wrist and ankle.

With regard to the brain, the anthropoid cerebrum, or fore-brain, is greatly convoluted, and differs from that of the Lemurs by its proportionately larger size, the cerebellum, or hind-brain, being as a rule entirely covered by it.

The uterus and structures for the nutrition of the young prior to birth differ greatly in this Sub-order from the conditions existing in the *Lemuroidea*. The uterus is a simple and not a two-horned sac, and its inner layer, in which the foetal and maternal structures intermingle during the growth of the embryo, is shed after the birth of the young, which is not the case in the Lemurs.

“The resemblance of Monkeys to Man,” says Mr. Darwin, “is greatly caused by the relative position of the features of the face. The eyes are arched over; they are separated by a long nose, the end of which in some is very human. The mouth is not carried back, but occupies the same general position as in Man, and the forehead, so often wrinkled, is usually prominent and like that of a child. The likeness is increased by the fact that anger, sorrow, pleasure, and satisfaction, are displayed by the Monkey by nearly similar movements of the muscles and skin, chiefly above the eyebrows and round the mouth. Some few expressions are indeed almost the same, as in the weeping of certain kinds of Monkeys, and in the

laughing noise made by others, during which the corners of the mouth are drawn backward and the eyelids wrinkled. In Man the nose is much more prominent than in most Monkeys; but we may trace the commencement of an aquiline curvature in the nose of the Hoolock Gibbon, and this in the Great-nosed Monkey (*Nasalis larvatus*) is carried to a ridiculous extreme."

In regard to the distribution of the *Anthropoidea*, excluding Man (*Hominidae*), two families (the *Hapalidae* and *Cebidae*) are known only from the New World; and two others (the *Cercopithecidae* and *Simiidae*) are exclusively confined to the Old World. No fossil remains of Eastern Hemisphere forms have as yet been found in the Western, or *vice versâ*, a fact which indicates, doubtless, a separation of great antiquity between the two groups. The various species of these families are to be found chiefly in the warmer regions on both sides of the equator. In the New World some species range as far north as to 20° N. lat. in Mexico; and South, to 30° below the equator. In the Eastern Hemisphere, the Old World species predominate in the tropical and sub-tropical regions; but certain forms have spread as far north as Thibet and Japan, and others have made the high altitudes of the Himalaya Mountains their home; while to the southward they extend in Africa nearly to the Cape of Good Hope. No indigenous species have ever been found in New Guinea, Australia, New Zealand, or in the Pacific, or West Indian Islands.

The Apes of the Old World differ in many important characters from those of the New. Among the former, as already mentioned, the openings of the nostrils are directed downwards, as in Man; the nose is narrow, and the nostrils themselves are set close together, being separated from each other by a thin septum, or partition, of cartilage. On this account,

they have received the name of Catarrhine Monkeys (*Catarrhini*).^{*} The New World Monkeys, on the other hand, have the nose flat and the opening of their nostrils directed outwards, and the one nostril widely separated from the other by a broad cartilaginous septum, and they are therefore designated Platyrrhine Monkeys (*Platyrrhini*).[†]

The dental formula of the Old World forms is $I_{\frac{2}{2}}, C_1^1, P_{\frac{2}{2}}, M_{\frac{3}{3}}$, making a total of thirty-two teeth in all ; but those of the Western Hemisphere differ in having invariably three premolars, and sometimes two molars, instead of three, so that they possess either thirty-two or thirty-six teeth altogether. There is always a gap, or *diastema*, in the series of the teeth in front of the upper and behind the lower canines ; the latter teeth being taller than the rest. Many of the Catarrhine Apes have large cheek-pouches as well as bare patches, or callosities, often brightly coloured, on the part they apply to the ground when sitting. None of the Platyrrhine group have cheek-pouches or callosities, but in many of them the tail is marvellously prehensile, which is not the case in any of the Old World species. Again, in the Apes of the Eastern Hemisphere, the ear-capsules of the skull have an external bony channel (or *meatus*) for conveying the sound vibrations into the ear, which is absent in the American species.

As a rule the Platyrrhine Monkeys have the fore-limbs shorter than the hind-, and are more quadrupedal than those of the Old World. Their thumb is also more like a finger than the same digit in their Eastern brethren.

Of the New World Monkeys, the *Hapalidæ*, or Marmosets, have thirty-two teeth, and the *Cebidæ*, with several sub-

^{*} Κατά, down ; ῥίς, ῥινός, nose.

[†] πλατὺς, flat ; ῥίς, ῥινός, nose.

families, have thirty-six teeth. The former include the Marmosets (*Leontopithecus*) and the Tamarins (*Leontopithecus*). The latter comprise the Capuchins (*Cebus*), which may be taken as the representative genus of American Monkeys, the Woolly Monkeys (*Lagothrix*), the Spider-Monkeys (*Ateles* and the allied *Eriodes*), the Howlers (*Myiotes*), the Sakis (*Pithecia* and *Brachyurus*), the Night-Monkeys or Douroucolis (*Nyctipithecus*), and the Squirrel Monkeys or Saimiris (*Chrysomys*), with the allied *Callithrix*.

"The extensive equatorial forests of the Amazon and Orinoco, and their tributaries, constitute *par excellence* the home of the American Monkeys, but the majority of the genera have a very extended range, appearing in one or more species throughout the greater portion of the tract covered by the entire family. This is more particularly the case with the Sapajous (*Cebus*), Spider-Monkeys, Howlers, and the species of *Callithrix*. The range of the species, on the other hand, is not unfrequently very sharply defined, as, for example, when a natural barrier, offering insurmountable obstacles to further migration, suddenly interposes itself. Examples of such limitation, as brought about by the dominant water-courses of the equatorial forests," are numerous. Mr. Wallace cites the case of certain species of Saki Monkey (*Pithecia*), found on either side of the Amazon river, whose range, either southward or northward, appears to be limited by that river. "The number of species of these American Apes found in, and north of, the Isthmus of Panama is ten, of which only one (*Ateles vellerosus*) extends into Mexico; *Myiotes villosus*, the Guatemalan Howler, or 'Mono,' has thus far been found only in Guatemala and Honduras. It is a little surprising that the range of only two of the species—the Black-faced Spider-Monkey (*Ateles ater*)

and one of the Night-Apes (*Nyctipithecus vociferans*)—extends beyond Colombia, in South America.”

“None of the South American Monkeys appear to pass west of the Andean chain of mountains south of Ecuador, and even north of the Peruvian boundary the number of such transgressional forms is very limited. Indeed, even among the wooded slopes, a habitation along the basal line of the mountain axis seems to be much preferred. The greatest altitude at which Monkeys were observed by Tschudi in Peru was 3,000 feet (*Lagothrix humboldti*); *Ateles ater* and *Cebus robustus* were found at 2,500 feet. On the other hand, Salvin and Godman state that in the district of Vera Paz, in Guatemala, the ‘Mono’ or Howler is most abundant at an elevation of 6,000 feet; and on the Volcano of Atitlan, in the same country, Mr. Salvin found troops of the Mexican Spider-Monkey (*Ateles vellerosus*) in the forest region of 7,000 feet elevation.

“The range of the Marmosets and Oustitis (*Hapalidæ*) is nearly co-extensive with that of the Monkeys proper.” (*Heilbrin.*) The Pigmy and the Silky Marmoset range as far north as Mexico.

Callitrichidæ

THE MARMOSETS AND TAMARINS. FAMILY HAPALIDÆ.

Of the New World, or Platyrrhine, Apes, the Marmosets come to be described first, as they have many characters which mark them out as the lowest of the *Anthropoidea*, and rank them nearer to the *Lemuroidea* than any of the others. They are specially characterised by having only thirty-two teeth, their dental formula being $I_{\frac{2}{2}}, C_{\frac{1}{1}}, P_{\frac{3}{3}}, M_{\frac{2}{2}}$. In the actual number of their teeth they agree with their Eastern relations, but with this

difference, that in the latter the pre-molars are two, and the molars three, above and below on each side. Their flattened nose, with its wide partition between the nostrils, and their non-prehensile bushy tails, are also distinguishing characters. The face is nude, the ears large and sometimes fringed. Their hind-limbs are proportionately larger and longer than their fore-limbs, while the nails of their fingers and toes are not flattened as in the Old World Apes, but all form sharp curved claws, except on the much shortened great toe. The thumb is elongated and lies parallel, but quite unopposable to, nor indeed is it separable at will from, the rest of the digits. The fore-foot, consequently, "is a mere paw, and the term 'hand' is not applicable to it." . . . The plantar surface of the hind-foot "is very long, and the digits are very short. It follows from these facts that the term 'quadrumanous' is not applicable in any sense to the Marmosets." (*Huxley*.) These animals have no callosities over the ischial (or buttock) bones, and no cheek-pouches. In their smooth and rounded skull superciliary ridges are conspicuously absent; and the ear-capsules have, as has been already observed, no external bony canal for conducting sound vibrations to the inner ear. The hyoid bone resembles that of the Lemurs.

This family has been divided into two genera, distinguished from each other only by a variation in the relative length of their incisor and canine teeth, which is so slight as to render it doubtful whether these differences really warrant the generic separation of the two groups. As, however, the distinction has been maintained by nearly all writers upon these animals, the arrangement has been followed here, and the various species of the family will be described as true Marmosets (*Hapale*) and

Tamarins (*Midas*). They are most numerous in the equatorial forests of South America.

THE MARMOSETS. GENUS ~~HAPALE~~. *Callithrix*

Hapale, Illiger, Prodr. Syst. Mamm., p. 71 (1811). *Callithrix* 1871

The members of this genus, which are often kept in captivity as pets, are very small animals, covered with thick and silky fur, and having bushy tails, equal to or even exceeding the length of their body. The head is round, the eyes large and watchful, the face short and nude, and often abundantly whiskered. The mouth is large; the ears also large and often fringed, and the neck sometimes clothed, with long hair. They are distinguished from the Tamarins (*Midas*) by having their upper incisor teeth long, narrow, and protruding outwards and forwards; the incisors of the lower jaw are also very long, and its canines small and shorter than the incisors, both being protrusive, as among the Lemurs. The cranial region of the smooth skull is conspicuously large in comparison with its facial portion, but the cerebrum shows a low type of organisation, and indicates a small degree of intelligence in its possessor; it is smooth and almost devoid of convolutions; the cerebrum, too, unlike that of the *Lemuroidea*, completely covers the cerebellum. The orbits are large, and almost completely walled in from the temporal depression behind. The stomach in form resembles that found in the higher groups, but its orifices for the entrance and exit of food are nearer to each other than in any of the other American Monkeys.

The female produces two or three young at a birth, instead of one, as is the general rule among the *Anthropoidea*. The species vary much in coloration, and some of them resemble the Lemurs in being ring-tailed.

The Marmosets are all gentle and playful in disposition, and are, on this account, very largely brought to Europe as pets; but they are very delicate, and rarely survive long in confinement after the advent of the Northern winter. They are arboreal, living in troops, and feeding on insects and fruit, and not disdaining flesh, especially of fishes, when they can obtain it. They emit a characteristic chirping noise.

I. THE COMMON MARMOSET. *HAPALE JACCHUS*.

Simia jacchus, Linn., Syst. Nat., i., p. 40 (1766).

Jacchus penicillatus, Geoffr. Ann. Mus., xix., p. 119 (1812); Spix, t. c. p. 34, pl. 26 (1823).

Jacchus leucocephalus, Geoffr., t. c. p. 119.

Jacchus vulgaris, Geoffr., t. c. p. 119; Gray, Cat. Monkeys Brit. Mus., p. 63 (1870, in part).

Hapale jacchus, Kuhl, Beitr., Zool., p. 46 (1820); Schleg., Mus. Pays Bas, vii., p. 271 (1876).

Hapale albicollis, Spix, Sim. et Vespert. Bras., p. 33, pl. 25 (1823); Geoffr., Cat. Méth. Primates, p. 59 (1851).

Characters.—Head small; eyes gentle; nose flat; face black, with a white spot in front; ears naked, with a tuft of long hairs on the front edge of its opening, either black, white, or grey; hair of the sides of the head elongated; back cross-banded with black and grey, the hair at the base dusky, reddish-brown in the middle, grey at the top. Tail banded with black or grey.

Several species have been described under the names of the White-necked Marmoset (*H. albicollis*, Spix), the Black-eared Marmoset (*H. penicillata*, Kuhl), and the White-headed Marmoset (*H. leucocephala*, Kuhl), but Dr. Gray considered these to be only varieties of the common species, which has some-

times the head and neck greyish-white, or the head, neck and ear-tufts black, or the head alone white.

Distribution.—Island of Marajo, at the mouth of the Amazon.

Habits.—The Common Marmoset is an inhabitant of the forests, feeding chiefly on fruits and insects. It is very susceptible to cold, and lives but a short time when removed from the tropics, unless extreme care be taken. Mr. Bates, the author of "The Naturalist on the River Amazons," states that when in Para, he counted in a short time thirteen different species of Monkey in semi-domestication in the city, either at the doors or windows of houses, or in the native canoes. Two of them he did not meet with afterwards in any other part of the country. One of these was the well-known *Hapale jacchus*, a little creature resembling a Kitten, banded with black and grey all over the body and tail, and having a fringe of long white hairs surrounding the ears. It was seated on the shoulder of a young mulatto girl as she was walking about the street, and he was told that it had been captured in the island of Marajo.

II. THE WHITE-SHOULDERED MARMOSET. *HAPALE* HUMERALIFER.

Hapale humeralifer, Geoffr., Ann. Mus., xix., p. 120 (1812);
Bates, Nat. Amaz., ii., p. 55 (1863).

Characters.—Face partly naked, flesh-coloured; ears fringed with long white hairs. Fore-part of body white; hands grey; hind part black, with the rump and under side reddish-tawny; tail banded with grey and black; long white hair on the shoulders. Length about 8 inches, exclusive of the tail.

Distribution.—Mr. Bates says that this species seems to occur

only in the dry woods bordering the Campos in the interior of Brazil.

Habits.—"One would mistake it," writes Mr. Bates in reference to this rare little Marmoset—the prettiest species of its family—"at first sight for a Kitten, from its small size, varied colours, and the softness of its fur. It was a most timid creature, screaming and biting when anyone attempted to handle it. It became familiar, however, with the people of the house, a few days after it came into their possession. When hungry or uneasy, it uttered a weak querulous cry, a shrill note which was sometimes prolonged so as to resemble the stridulation of a grasshopper."

III. THE WHITE-EARED MARMOSET. *HAPALE AURITA*.

Jacchus auritus, Geoffr., Ann. Mus., xix., p. 19 (1812).

Hapale aurita, Kuhl, Beitr. Zool., p. 48 (1820); Schl., Mus. Pays Bas, vii., p. 276 (1876).

Characters.—Larger than *Hapale jacchus*; ears naked, external, exposed, with a band of long hairs across the inner surface of the conch, forming a short grey tuft; tail ringed, blackish, the hair minutely punctulated with yellow or red; sides of the head, limbs, and hinder part of body blackish-brown; face more or less white; back blackish, without indication of cross-bands.

Distribution.—Brazil.

IV. THE WHITE-FOOTED MARMOSET. *HAPALE LEUCOPUS*.

Hapale leucopus, Günth., P. Z. S., 1876, p. 743, pl. lxxii.

Characters.—Hair of back and sides moderately long, silky, brownish-grey; nape and occiput darker; face and head covered with short sparse white hair; ears large, naked, and without tufts; throat greyish-brown; under side of body and

inside of legs rusty-red; fore-arm, hands, and feet white—the hairs short, blackish or black, with white tips. Head and body, 11½ inches long; tail, 14½ inches. Dorsal and lumbar vertebræ together, 19.

Female.—Similar to the male, but with the hairs of the upper parts silver-tipped.

Distribution.—Medellin, in the province of Antioquia, United States of Colombia.

Habits.—Unknown.

V. THE GOLDEN MARMOSET. *HAPALE CHRYSOLEUCA.*

Hapale chrysoleucos, Wagner in Wieg. Arch., 1842, i., p. 357; id. in Schreb. Säugeth., Suppl., v., p. 125 (1855); Sclater, P. Z. S., 1869, p. 594.

Mico sericeus, Gray, P. Z. S., 1868, p. 256, pl. xxiv.

Miocella chrysoleucos, Gray, Cat. Monkeys Brit. Mus., p. 131 (1870).

Miocella sericeus, Gray, Cat. Monkeys Brit. Mus. App., p. 131 (1870).

Hapale chrysoleuca, Schl., Mus. Pays Bas, vii., p. 227 (1876).

Characters.—Ears large, naked, exposed, margined with long white hairs. General colour white; limbs, under surface, and tail, uniform greyish-yellow, or reddish-brown in some varieties.

Distribution.—Forests of Brazil; vicinity of Borba, on the Rio Madeira.

VI. THE PIGMY MARMOSET. *HAPALE PYGMÆA.*

Jacchus pygmæus, Spix, Sim. et Vespert. Bras., pl. xxiv., fig. 2 (1823).

Hapale pygmæa, Wagner in Schreber, Säugeth., v., p. 126 (1855). Castelnau, Voy. Amér. Sud, pl. 5, figs. 1, 2; Schl., Mus. Pays Bas, vii., p. 277 (1876).

Cibuella pygmaea, Gray, Cat. Monkeys Brit. Mus., p. 64 (1870).

Characters.—Face with long brown whiskers, naturally brushed back over the ears; ears small, with a few scattered hairs over them, but no ear-tufts, sunk in the long fur of the head. General colour brownish-tawny; tail ringed with black. The young resemble the adults from their earliest days.

This is the most diminutive Monkey known, and measures only six inches in length.

Distribution.—Forests of Brazil, extending north into Mexico. Mr. Bates remarks in reference to this species: "I was surprised on my return to England to learn that the Pigmy Marmoset was found also in Mexico, no other Amazonian Monkey being known to wander far from the great river plain. Thus the smallest, and apparently the feeblest, species of the whole order is one which has by some means become the most widely dispersed."

Habits.—Little or nothing is known of the habits of this individual species, but there is very little doubt that they agree closely with those of the Common Marmoset.

VII. THE BLACK-TAILED MARMOSET. *HAPALE MELANURA*.

Simia argentata, Linn., Syst. Nat., p. 40 (1766), albino var.

Jacchus melanura, Geoffr., Ann. Mus., xix., p. 120 (1812); Gray, P. Z. S., 1865, p. 734.

Jacchus argentatus, Geoffr., t. c. p. 120.

Hapale melanura (nec Kuhl); Wagner in Schreb., Säugeth., i., p. 127, fig. 36 (1840), and Suppl. v., p. 15, fig. 13 (1855); Schl., P. Z. S., 1875, p. 419, pl. 1.; Schl., Mus. Pays Bas, vii., p. 267 (1876).

Midas argentatus, Bates, Nat. Amaz., i., p. 162 (1863).

Mico melanurus, Gray, Cat. Monkeys Brit. Mus., p. 64 (1870).

Hapale argentata, Schl., Mus. Pays Bas, vii., p. 268 (1876).

Characters.—Face naked, flesh-coloured; ears naked, flesh-coloured, exposed; no ear-pencils, as in *H. chrysolenca*; tail uniform black; head and fore-limbs pale brown; front of the body paler; front edges of the thighs, and a band across the loins, white. Length, 7 inches, without the tail. Some varieties have the body entirely covered with long, white, silky hairs.

Distribution.—Bolivia and Brazil. Mr. Bates says that the Black-tailed Marmoset is one of the rarest of the American Monkeys. He did not hear of its being found anywhere in Amazonia except near Cametá, on the River Tocantins.

Habits.—Little is known of the habits of this species, few naturalists having had the good fortune to observe it in its native state. Mr. Bates, however, once saw three individuals together, running along a branch, and looking like white Kittens. "I afterwards saw a pet animal," he says in his book, "of this species, and heard that there were many so kept, and that they were esteemed as choice treasures. . . . It was a most timid and sensitive thing. The woman who owned it carried it constantly in her bosom, and no money would induce her to part with her pet. . . . The nervous little creature would not permit strangers to touch it. If anyone attempted to do so, it shrank back, the whole body trembling with fear, and its teeth chattered, whilst it uttered its tremulous, frightened tones. The expression of its features was like that of its more robust brother, *Midas ursulus*; the eyes, which were black, were full of curiosity and mistrust, and it always kept them fixed on the person who attempted to advance towards it."

THE TAMARINS. GENUS MIDAS.

Midas, Geoffr., Ann. Mus., xix., p. 120 (1812). *not Latrille 1796* *Leontopithecus*

This genus differs from the preceding only in the characters of some of the teeth. The canine teeth in the lower jaw are longer than their neighbouring incisors; but, as has been pointed out by Prof. St. George Mivart, it is a question whether this generic distinction can be maintained, as an intermediate condition exists in some forms.

For the convenience of description the species of this genus have been divided into two groups—(a) those with long hair on the head and neck, and (b) those with short hairs on the back of the head. The number of species in the latter group is greater than in the former; and they are further divided into those with, and those without, white lips.

I. THE SILKY TAMARIN. MIDAS ROSALIA.

Simia rosalia, Linn., Syst. Nat., i., p. 41, pl. i. (1766).

Midas rosalia, Geoffr., Ann. Mus., xix., p. 121 (1812).

Leontopithecus rosalia, Gray, Cat. Monkeys Brit. Mus., p. 65 (1870).

Hapale rosalia, Schl., Mus. Pays Bas, vii., p. 250 (1876).

Characters.—This is the first species of the long-whiskered and maned group; fur soft and silky; tail equal in length to the body, bushy at the tip; hair round the face and on the back of the neck very long, forming a conspicuous ruff. Face, hands, and feet purple; general colour of the hair golden yellow, more or less red, and glossy.

These animals are said to possess an air-sac in the throat, at the back of the *trachea* (or windpipe), as in *Ateles*. Length, 11 inches; tail, 12 inches.

Distribution.—The Silky Tamarin is found in the forests of South-eastern Brazil, in the coastal forests of New Granada, and as far north as the Isthmus of Panama.

Habits.—The “Marakina,” as this exceedingly beautiful species is often called, lives in small troops, ascending to the slender branches at the tops of the highest trees in the forest. The species is very playful and intelligent.

Closely related to the Silky Tamarin, if indeed it is really distinct from it, is the Maned Tamarin (*M. leoninus*, of Humboldt), which inhabits the same region, and is only seven inches in length, exclusive of the tail. “It is named *leoninus*,” remarks Mr. Bates, “on account of the long brown mane which depends from the neck, and which gives it very much the appearance of a diminutive Lion.” In referring to their intelligence, the same writer continues, “Isidore Geoffroy St. Hilaire relates of a species of this genus, that it distinguished between different objects depicted on an engraving. M. Audouin showed it the portraits of a cat and a wasp; at these it became much terrified, whereas at the sight of a figure of a grasshopper or beetle it precipitated itself on the picture as if to seize the objects there represented.”

Another species, the Golden-headed Tamarin (*M. chrysomelas*, of Kuhl), which is in general colour black, with the head, fore-arms, hands, and a line beneath the tail, golden-yellow, is, according to Dr. Gray, “very like a melanism of *Leontopithecus* (= *Midas*) *rosalia*; but the hands and feet, which are sometimes blackish in that species, are yellow—that is to say, not changed.”

II. GEOFFROY'S TAMARIN. MIDAS GEOFFROYI.

Midas adipus, var. Spix, Sim. et Vespert. Bras., p. 30, pl. 23 (1823).

Hapale geoffroyi, Pucher., Rev. Zool., 1845, p. 336; Schl., Mus. Pays Bas, vii., p. 258 (1876).

Midas geoffroyi, Is. Geoffr., Cat. Méth. Primates, p. 63 (1851); Slater, P. Z. S., 1871, p. 478, pl. xxxviii.

Midas ursulus (nec Geoffr.), Rep. Council Zool. Soc., 1858, p. 16.

Cedipus geoffroyi, Gray, Cat. Monkeys Brit. Mus., p. 65 (1870).

(Plate XIII.)

Characters.—Face black; a patch on the top of the head white; back of neck and shoulders, lower part of back, and upper side of base of tail rusty-brown; ears, back, outer side of arms and thighs, and outer side of upper part of leg, brownish-grey; throat, under surface of body, outer and inner surface of fore-arms and legs, white; remainder of tail black.

Hair on the crown of the head short, forming a narrow oblong patch; that on the nape of the neck elongated.

Distribution.—At present only known from Panama.

Habits.—Unknown.

III. THE PINCHÉ MONKEY. MIDAS CEDIPUS.

Simia œdipus, Linn., Syst. Nat., i., p. 41 (1766); Audeb.

Singes, Fam. vi., Sect. ii., pl. i., fig. 2. (1727).

Midas œdipus, Geoffr., Ann. Mus., xix., p. 122 (1812).

Cedipus titi, Gray, Cat. Monkeys Brit. Mus., p. 65 (1870).

Hapale œdipus, Schl., Mus. Pays Bas, vii., p. 258 (1876).

Characters.—Face and sides of head nearly naked; top of head with large, erect, crest; hair of neck elongated; tail not ringed.

General colour greyish-brown; outside of limbs and base of tail, washed with rusty-red; crest, throat, and lower surface



GEOFFROY'S TAMARIN.

of body, fore-limbs and front edge of hind-limbs white ; extremity of the tail black.

Differs from the preceding species, *M. geoffroyi*, in having a crest.

Distribution.—The Pinché Monkey is found in the forests of New Granada, near the coast.

With the succeeding species we commence the description of the Tamarins which have no conspicuous mane on the back of the neck, and that section whose members have a patch of white hairs around the mouth, each looking at a short distance, as Mr. Bates remarks, “as though it held a ball of snow-white cotton in its teeth.”

IV. THE WHITE-LIPPED TAMARIN. MIDAS LABIATUS.

Midas labiatus, Geoffr., Ann. Mus., xix., p. 121 (1812) ; Gray, Cat. Monkeys Brit. Mus., p. 66 (1870).

Jacchus labiatus, Desmarest, Mammalog., p. 95 (1820) ; Humb., Rec. d'Obs. Zool., Prod. sp. 44 (1811).

Hapale labiata, Wagner in Schreb., Säugeth., i., p. 246 (1840) ; Mus. Pays Bas, vii., p. 260 (1876, part).

Characters.—General colour black ; under side reddish, the black terminating on the front of the chest in a straight line, the hinder part of the back washed with grey ; the hinder part of the chest, belly, inside of the limbs, and the under side of the root of the tail, rust-colour ; tip of nose and edges of upper and lower lips white.

Distribution.—The forests on the north side of the Amazon.

V. THE RED-BELLIED TAMARIN. MIDAS RUFIVENTER.

Midas rufiventer, Gray, Ann. and Mag. N. H., xii., p. 398 (1843); id. P. Z. S., 1865, p. 735; id. Cat. Monkeys Brit. Mus., p. 66 (1870).

Midas elegantulus, Slack, Proc. Acad. Nat. Sc. Philad., 1861, p. 463.

Hapale labiata (nec Geoffr.), Schl., Mus. Pays Bas, vii., p. 260 (part).

Characters.—Head, throat, fore-limbs, tail, and hands deep glossy black; hairs of back, sides, and posterior limbs black, broadly tipped with white, not regularly ringed; belly, breast and inner surface of limbs bright brick-red, separated by a distinct line from the black of the back and outer surface of the limbs. On the back of the head a small patch of the same colour as the back; on the top of the head a golden-yellow triangular patch. Lips and tip of the nose, white.

This species is distinguished from the White-lipped Tamarin (*M. labiatus*) by the spot on the crown and nape; and by the rufous of the under side extending forward nearer to the throat.

Distribution.—Banks of the Upper Amazon. Mr. Bates shot a specimen at Tunantins in 69° W. long., and 4° S. lat.

Habits.—Nothing is known of the habits of this species.

Closely allied to the Red-bellied Tamarin is the so-called MOUSTACHED TAMARIN (*Midas mystax*, Spix), in which the head, shoulders, and tail are black; the body above brown, sometimes ringed with white, and the belly bright rust-coloured. It can be distinguished, as Dr. Slack points out, from *M. rufiventer*, by the want of the ashy tips to the hairs of the back

and posterior limbs, and the triangular golden spot on the vertex. The hairs of this spot are golden throughout their entire length, in this respect resembling another closely related Upper Amazonian species, the so-called BONNETED TAMARIN (*M. pileatus*, Is. Geoffr.), from which it can readily be distinguished by the black colour of the under surface. The back of the Bonneted Tamarin is also varied, black and grey, the limbs and tail are blackish, and the lips white.

VI. DEVILLE'S TAMARIN. MIDAS WEDDELLI.

Midas weddellii, Deville, Rev. et Mag. de Zool., 1849, p. 55.

Midas devillii, Is. Geoffr., Cat. Méth. Primates, p. 64 (1851);

Castelnau, Expéd. Amér. Sud, Mamm., pl. vi., fig. 2

(1855); Gray, Cat. Monkeys Brit. Mus., p. 67 (1870).

Midas leucogenys, Gray, P. Z. S., 1865, p. 735; id. Cat.

Monkeys Brit. Mus., p. 67 (1870).

Hapale devillei, Schl., Mus. Pays Bas, vii., p. 262 (1876).

Hapale weddellii, Schl., t. c. p. 262.

Characters.—Fur of back ringed with grey; that of the head, neck, and front of the fore- and hind-limbs, tail, hands, and feet black; loins, thighs, legs, and base of tail bright maroon.

Distribution.—Obtained by MM. Castelnau and Deville, at Sarayacu, in the Peruvian Amazons.

VII. THE BLACK-FRONTED TAMARIN. MIDAS NIGRIFRONS.

Midas nigrifrons, Geoffr., Cat. Méth. Primates, p. 64 (1851).

Midas flavifrons, var. c. *Midas nigrifrons*, Gray, Cat. Monkeys Brit. Mus., p. 67 (1870).

Hapale nigrifrons, Schl., Mus. Pays Bas, vii., p. 263 (1876).

Characters.—Differs from *M. weddelli* in having the fur washed with rufous, and the hairs finely ringed.

Distribution.—Unknown.

VIII. THE BROWN-HEADED TAMARIN. *MIDAS FUSCICOLLIS*.

Midas fuscicollis, Spix, Sim. et Vespert. Bras., p. 27, pl. 20 (1823).

Midas flavifrons, Is. Geoffr., Cat. Méth. Primates, p. 64 (1851); Castelnau, Expéd. Amér. Sud, Mamm., pl. vi., fig. 1 (1855); Gray, Cat. Monkeys, Brit. Mus., p. 67 (1870).

Midas devillii (nec Is. Geoffr.), Slack, Proc. Acad. Nat. Sc. Philad., 1861, p. 464.

Hapale fuscicollis, Schl., Mus. Pays Bas, vii., p. 264 (1876).

Hapale chrysomelas (nec Kuhl), Schl., t. c. p. 254.

Characters.—Pelage mostly black; head and face brown or reddish-brown, with some grey hairs; lips white, but the nose black; top of the head yellow, or yellowish-red; back yellow and black; hands and feet black; outside of the limbs and base of the tail reddish; under side of the body and inside of the limbs brownish-red.

The female differs in having the outside of the limbs and the underpart of the body blackish.

Distribution.—Brazil.

Habits.—Nothing is known of the individual habits of this species.

IX. THE YELLOW-TAILED TAMARIN. *MIDAS CHRYSOPYGUS*.

Hapale chrysopyga, Wagner, in Schreb. Säugeth., i., Simiæ, p. 249 (1840); Schl., Mus. Pays Bas, vii., p. 254 (1876).

Characters.—Similar to *M. fuscicollis*. Black, with the thighs, legs, and base of tail rusty-red.

Distribution.—Brazil, near Ypanéma, Province of St. Paulo.

X. THE BLACK AND RED TAMARIN. *MIDAS NIGRICOLLIS*.

Midas nigricollis, Spix, Sim. et Vespert. Bras., p. 28, pl. 21 (1823).

Midas rufoniger, I. Geoffr. et Deville, C. R., xxvii., p. 499 (1848); Is. Geoffr., Cat. Méth. Primates, p. 64 (1851); Castelnau, Expéd. Amér. Sud, pl. v., fig. 3 (1855); Gray, Cat. Monkeys Brit. Mus., p. 67 (1870).

Hapale nigricollis, Schl., Mus. Pays Bas, vii., p. 264 (1876).

Characters.—Differs from *M. fuscicollis* in having the back, loins, thighs, and legs bright reddish-chestnut. (Gray.) Mouth bordered with longish white hairs.

Distribution.—The Upper Amazon Region. (Bates.) The Black and Red Tamarin is considered by Mr. Bates to be a form or race of the same stock as *M. ursulus*, modified to suit the altered local conditions of its home, for in the Upper Amazon Region, as Mr. Wallace has pointed out, the seasons, as well as the nature of the country, differ very considerably.

Habits.—Mr. Bates states that in its habits the present species is similar to *Midas ursulus*. "One day," he says, "whilst walking along a forest pathway, I saw one of these lively little fellows miss his grasp as he was passing from one tree to another along with his troop. He fell head foremost from a height of at least fifty feet; but managed cleverly to alight on his legs on the pathway; quickly turning round, he gave me a good stare for a few minutes, and then bounded off gaily to climb another tree."

XI. ILLIGER'S TAMARIN. *MIDAS ILLIGERI*.

Hapale illigeri, Pucher., Rev. Zool., 1845, p. 336.

Midas illigeri, Geoffr., Cat. Méth. Primates, p. 65 (1851);
Schl., Mus. Pays Bas, vii., p. 65 (1876).

Midas flavifrons, var. *d.* Gray, Cat. Monkeys Brit. Mus., p. 67
(1870).

Midas devillii (nec Geoffr.), Sclater, P. Z. S., 1871, p. 220, pl. xiii.

Characters.—Head black; back black, washed with grey; back of head, nape of neck, shoulders and humeral region black, washed with reddish-brown; under side and the outer and inner surface of both limbs red; tail at base and tip red, intermediate portion black.

The sexes hardly differ; the male being merely rather larger and darker, especially on the head and nape, where the hair is longer.

Distribution.—Mr. E. Bartlett says that this was the only *Midas* met with by him in Eastern Peru. It was plentiful everywhere in the Peruvian Amazons; and he obtained specimens both on the Huallaga and Ucayali rivers.

Habits.—This species is extremely delicate, and will not bear the least cold. "I have had them alive," writes Mr. Edward Bartlett, "for two or three weeks; but they appear to suffer from cold and die. They are kept, however, by the Indian women, who make pets of them and put them into the long hair on their heads. With this protection they are able to live for a long time. Having become tame, they frequently hop out and feed, or, having captured a spider or two, scamper back again, and hide under the luxuriant crop of their owners, who are generally unwilling to part with them."

With the succeeding species commences the group of Tamarins with no mane and without white lips.

XII. THE PIED TAMARIN. MIDAS BICOLOR.

Midas bicolor, Spix, Sim. et Vespert. Bras, p. 31, pl. 24, fig. 1 (1823).

Hapale bicolor, Wagner in Schreb., Säugeth., v., p. 135, pl. 12 (1855); Schl., Mus. Pays Bas, vii., p. 257 (1876).

Seniocebus bicolor, Gray, Cat. Monkeys, Brit. Mus., p. 68 (1870).

Characters.—Head naked in front of the ears in the adult; hind-part of the head covered with long white hairs; ears exposed, naked; tail not ringed, the upper side black; nose and lips black; neck, chest and arms white; face, body, and hind-limbs brown; under side of tail, inner side of limbs, and the abdomen ferruginous.

In the young animal, the face is rather hairy and the forehead naked. (*Gray.*)

Distribution.—The eastern bank of the Rio Negro, a northern tributary of the Amazon. Mr. Bates obtained a specimen at Barra, where it was rather common in the forest; and, he adds: "This place, a waterfall near Barra, which its citizens consider as the chief natural curiosity of their neighbourhood, is classic ground to the naturalist, from having been a favourite spot with the celebrated travellers Spix and Martius, during their stay at Barra in 1820. Von Martius was so much impressed by its magical beauty, that he commemorated the visit by making a sketch of the scenery, to serve as background in one of the plates of his great work on the Palms."

Habits.—Keeping together in small troops, running along the main boughs of the loftier trees, climbing perpendicular trunks, but never taking flying leaps.

XIII. LACÉPEDE'S TAMARIN. MIDAS MIDAS.

Simia midas, Linn., Syst. Nat., i., p. 42 (1766).

Simia lacepedii, Fischer, Bull. Soc. Mosc., 1806, p. 23.

Midas rufimanus, Geoffr., Ann. Mus., xix., p. 121 (1812).

Midas ursulus, var. Gray, Cat. Monkeys Brit. Mus., p. 68 (1870).

Hapale midas, Schl., Mus. Pays Bas, vii., p. 266 (1876).

Characters.—General colour black; hands and feet golden-yellow or bright rusty-red; ears short, haired. The young males resemble the adults.

Distribution.—Surinam.

XIV. THE NEGRO TAMARIN. MIDAS URSULUS.

Midas ursulus, Geoffr., Ann. Mus., xix., p. 121 (1812); Gray, Cat. Monkeys Brit. Mus., p. 68 (1870).

Midas tamarin, Slack, Proc. Acad. Nat. Sc. Philad., 1861, p. 464.

Hapale ursula, Schl., Mus. Pays Bas, vii., p. 265 (1876).

Characters.—Body long, slender, covered with soft thick fur; ears large, naked; the face haired. General colour black; nose and lips black; hinder part of the body rather mottled or banded with reddish-brown or greyish-white; the hands sometimes black and sometimes yellow. Length, 9 inches; tail, 15 inches.

Distribution.—Found on the Lower Amazon, near Para. Mr. Bates says it is not met with in the Upper Amazon Region, but in its stead a closely allied species (*Midas nigricollis*), presents itself.*

* Vide antea, p. 145.

Habits.—"The *Midas ursulus* is never seen," writes Mr. Bates, "in large flocks; three or four is the greatest number observed together. It seems to be less afraid of the neighbourhood of Man than any other Monkey. I sometimes saw it in the woods which border the suburban streets, and once I espied two individuals in a thicket behind the English Consul's house at Nazareth. Its mode of progression along the main boughs of the lofty trees is like that of the Squirrels; it does not ascend to the slender branches, or take wonderful flying leaps like those Monkeys whose prehensile tails and flexible hands fit them for such headlong travelling. It confines itself to the larger boughs and trunks of trees, its long nails being of great assistance to the creature, enabling it to cling securely to the bark; and it is often seen passing rapidly round the perpendicular cylindrical trunks. It is a quick, restless, timid little creature, and has a great share of curiosity, for when a person passes by under the trees along which a flock is running, they always stop for a few moments to have a stare at the intruder." In Para, the Negro Tamarin "is often seen in a tame state in the houses of the inhabitants. . . . When first taken, or when kept tied up, it is very timid and irritable. It will not allow itself to be approached, but keeps retreating backwards when anyone attempts to coax it. It is always in a querulous humour, uttering a twittering, complaining noise; its dark, watchful eyes, expressive of distrust, are observant of every movement which takes place near it. When treated kindly, however, as it generally is in the houses of the natives, it becomes very tame and familiar. . . . It is generally fed on sweet fruits, such as the banana; but it is also fond of insects, especially soft-bodied spiders and grasshoppers, which it will snap up with eagerness when within

reach. The expression of countenance in these small Monkeys is intelligent and pleasing. This is partly owing to the open facial angle, which is given as one of 60° , but the quick movements of the head, and the way they have of inclining it on one side, when their curiosity is excited, contribute very much to give them a knowing expression. . . . In mobility of expression of countenance, intelligence and general manners, these small Monkeys resemble the higher Apes far more than they do any rodent animal with which I am acquainted, notwithstanding their apparently low organisation in many points."

This description of the habits of the Negro Tamarin may be taken as representative of those of the various species of the genus, of whom only glimpses can be caught in their homes, which are the safe altitudes of the giants of the virgin forests of Brazil.

THE CAPUCHINS, HOWLERS, AND SPIDER-MONKEYS, &c. FAMILY CEBIDÆ.

This family embraces the typical Platyrrhine Monkeys, and to it belongs the great majority of the American species. As already pointed out (p. 127) their nose is flat, and the partition between the nostrils, which open sideways, is very broad, and separates them widely. They are essentially quadrupedal, and walk with the soles of both pairs of limbs flat to the ground. The Spider-Monkeys occasionally, however, assume an erect posture. "They all possess tails, and in some genera (*e.g.*, *Ateles*) this organ becomes very flexible and muscular, and the under surface of its curled extremity is devoid of hair and highly sensitive. The tail thus modified is a powerful prehensile organ and serves for a fifth hand." (*Huxley*.) In these

Monkeys there are no cheek-pouches, nor ischial callosities. Except in the Spider-Monkeys the hind-limbs are longer than the fore-; "while the thumb, even where it is best developed, is capable of but a partial opposition to the other fingers, bending almost in the same plane with the latter, so as to be more like a fifth finger." (*Mivart*.) Nevertheless, all its muscles, except the long flexor, are present. The great-toe is large and can be moved from and to the side of the other digits, but is not opposable to them.

The skull is smooth and has no muscular crests; the external bony tube to the ear is not ossified. The two extremes in its form are presented by the Howling Monkeys (*Alouatta*) and the Squirrel-Monkeys (*Chrysotrrix*), as pointed out by Professor Huxley in his "Anatomy of Vertebrated Animals": "In the former the face is very large and prominent, with a low facial angle. The roof of the brain-case is depressed; the plane of the *occipital foramen* [for the passage of the spinal cord] is almost perpendicular" to the axis of the base of the skull. In *Chrysotrrix*, on the contrary, the face is relatively small, with a high facial angle; the brain-case is moderately arched;" and the plane of the *occipital foramen* is horizontal.

The dentition of the *Cebidæ* is very characteristic of the family. The dental formula is $I_{\frac{2}{2}}, C_1, P_{\frac{3}{3}}, M_{\frac{3}{3}}$ and the teeth thirty-six in all—a larger number than is found in any of the Old World forms, or in the species of the last family (the *Hapalidæ*); for they possess an extra pre-molar tooth above and below on each side. Their molar teeth are four-cusped; and in the upper molars of the Spider-Monkeys (*Ateles*) and of the Howlers (*Alouatta*) there is an oblique cusp, such as is found in the molars of the *Lemuroidea*, joining the hind inner to the front outer cusp. Among the *Cebidæ* the brain varies

very much ; the posterior lobes of the main brain (or cerebral hemispheres, which are almost always convoluted) are also almost always so large as to entirely cover over the cerebellum (or hind brain), a relation which does not exist between these two regions of the brain in the *Lemuroidea*. The cerebellum, however, in the Howlers is slightly uncovered. The absolute size of the brain never, in any Ape, approaches that of Man. None of the *Cebidæ* attain the size of even the medium-sized Old World Apes.

The *Cebidæ* are all arboreal, and strictly confined to the forest regions of Tropical America, from the southern part of Mexico to about the parallel of 30° S. lat. They are divided into four sub-families, namely: The Douroucolis, or Night-Monkeys (*Nyctipithecinae*); the Saki Monkeys (*Pitheciinae*); the Howlers (*Mycetinae*); and the Capuchin Monkeys (*Cebinae*).

THE NIGHT-MONKEYS. SUB-FAMILY NYCTIPITHECINÆ.

The Night-Monkeys are small and elegant animals covered with long hair, and having long bushy tails, which are not prehensile, although they can be curled round a branch of a tree. The caudal vertebræ in these creatures are consequently not flattened from above downward, as is the case in the prehensile-tailed groups, but rounded. Their lower incisor teeth are set vertically and their thumb is fairly well developed.

This sub-family contains three genera, the Squirrel-Monkeys (*Chrysothrix*); the Whaiapu-Sais, or Titis (*Callithrix*); and the typical Night-Monkeys, or Douroucolis (*Nyctipithecus*).

THE SQUIRREL-MONKEYS. GENUS CHRYSOTHRIX.
Chrysothrix, Kaup., Thierreich., i., p. 51 (1835).

The Saimiris, or Squirrel-Monkeys, are very beautiful and active little animals, characterised by their soft, close, and erect fur, and especially in having the head produced posteriorly. The face is relatively small and has a high facial angle. The eyes are large, directed forwards, and set very close together. The ears are large; and the nose has a very broad partition between its nostrils. The tail is long, round, and covered with short hair; but tufted at the extremity and non-prehensile.

As regards the skeleton, the skull is elongated, and the arched cranial portion prolonged backwards, the length of the base of the skull being shorter than the cerebral cavity. The facial portion of the skull is relatively smaller and the cranial larger even than in Man; this character being, however, common to all the smaller representatives of particular groups, and obviously necessary to provide the requisite amount of brain-space." (*Mivart.*) The angle of the lower jaw is narrow behind. The bony partition between the nostrils is very thin and membranaceous; and that between the large orbits is also thin and imperfect. The lower incisor teeth are vertical, and in regular series with the canines, and the latter are well developed. No Primate has the teeth placed in one uninterrupted series except Man; but there is always a small interval between each upper canine and the adjacent incisor, and between each lower canine and the adjacent pre-molar.

The skeleton of the hand is one-fifth of the length of the spinal column. The wrist-bones are nine in number, the central—*os centrale*—being present as in the majority of Monkeys. In *Chrysothrix* and in *Nyctipithecus* also, the thumb is proportionately shorter than in any other genus, except among the Spider-Monkeys (*Ateles*), and the Old World

Guerezas (*Colobus*). In the length of their foot the members of this genus approximate to the proportion existing in Man; and its length, compared with that of the hand, is greater in *Chrysothrix* than in any other group of Monkeys.

The cerebral hemispheres project beyond the hind brain (*cerebellum*) to a greater relative extent than in any other mammal, namely, to one-fifth of their total length. (*Huxley*.) The external surface of the cerebral hemispheres is almost as little convoluted as in the Marmosets and Tamarins, in which it is almost quite smooth, yet on the inner faces of the hemispheres the more important grooves (*sulci*) are present. The opening for the passage of the spinal cord lies nearly in the middle of the base of the skull, whereas in other genera it is situated closer to the hinder region.

The Squirrel-Monkeys are entirely arboreal, and found in most of the tropical regions from Costa Rica to Brazil and Bolivia, being among the commonest of the Anthropoids of the American forests. They are diurnal, and feed chiefly on insects; but they will also often attack and devour small birds.

I. THE SHORT-TAILED SQUIRREL-MONKEY. CHRYSOTHRIX USTA.

Saimiris usta, Is. Geoffr., Arch. Mus., iv., p. 15, pl. 1 (1844).

Saimiris ustus, Bartlett, P. Z. S., 1871, p. 219; Sclater, P. Z. S., 1872, p. 688, fig. of head.

Chrysothrix ustus, Gray, Cat. Monkeys Brit. Mus., p. 53 (1870).

Saimiri sciureus (nec L.), Schl., Mus. Pays Bas, vii., p. 242 (1876, pt.)

Characters.—Face white; head grizzled grey, minutely punctulated with black, the hairs grey with black tips; outer side of fore-arm grizzled grey, but in some species golden; back

grizzled grey, washed with golden, the tips of the hairs black ; tail short, thick and grey, but with the tip black.

Distribution.—The forests of Bolivia and Brazil. This is a common species, inhabiting the whole of the Peruvian Amazons, and may be met with on every stream. (*E. Bartlett.*)

Habits.—Arboreal and gregarious, moving about in large numbers through the forest, feeding on insects—chiefly orthoptera and spiders—small birds, and fruits.

II. THE BLACK-HEADED SQUIRREL-MONKEY. CHRYSOTHRIX ENTOMOPHAGA.

Callithrix entomophagus, d'Orb., Voy. Amér. Mér., iv., Mamm. pl. 4 (1836).

Callithrix boliviensis, d'Orb., Nouv. Ann. Mus., iii., p. 89 (1834).

Saimiris entomophagus, d'Orb., Voy. Amér. Mér., iv., Mamm., text, p. 10 (1847) ; Is. Geoffr., Cat. Méth. Primates, p. 38 (1851).

Saimiri entomophagus, Schl., Mus. Pays Bas, vii., p. 246 (1876).

Chrysothrix sciurea (nec L.), Frantz. in Wiegmann Arch. f. Nat., xxxix., p. 260 (1869).

Chrysothrix entomophagus, Wagn., Ann. Nat. Hist., xii., p. 42 (1843) ; Gray, Cat. Monkeys Brit. Mus., p. 53 (1870).

Characters.—Face grey, washed with yellow ; ears haired ; head black ; hairs of back black, with long yellow tips, or yellow with black tips, producing a shade of brown washed with golden ; outer side of upper part of arms and legs yellow, peppered with black ; throat, under surface of body and inside of limbs yellowish-grey ; tail long, black.

In some species the upper part of the head has a shade of yellow, caused by the colour of the lower half of the hairs showing through the black tips.

Distribution.—Bolivia; Veragua, Central America; and the warmer regions of Costa Rica, where it inhabits the humid forests.

III. THE COMMON SQUIRREL-MONKEY. CHRYSOTHRIX SCIUREA.

Simia sciurea, Linn., Syst. Nat., i., p. 43 (1766); Humb., Obs. Zool., p. 334 (var. *cassiquiarensis*).

Callithrix sciureus, Geoffr., Ann. Mus., xix., p. 113 (1812).

Saimiri sciureus, Cuv., Reg. An., p. 103, pl. 1 (1829); Schl., Mus. Pays Bas, vii., p. 242 (1876).

Chrysothrix lunulata, Geoffr., Arch. Mus., iv., p. 18 (1844).

Chrysothrix sciurea, Wagner in Schreb., Säugth. Suppl., v., p. 120, pl. 9, (1855); Gray, Cat. Monkeys Brit. Mus., p. 53 (1870); Sclater, P. Z. S., 1880, p. 395.

Chrysothrix nigrivittata, Wagn., Abh. bay. Ak. München, v., p. 461.

Characters.—Smaller than the two preceding species; face greyish-white; chin round and prominent; head blackish-grey; back grey, or grey washed with gold, the basal part of the hairs golden and the tips black; outer side of the fore-arm yellow; tail long, slender, grizzled grey, with the tip black. Length of the body, 10 inches; of the tail, 14 inches.

Certain females, examined by Dr. Sclater, had a distinct black line along the side of the crown above each ear and extending in front, down the side of the face, nearly to a level

with the angle of the mouth ; but Mr. Buckley says the Indians consider the black lines to be merely a sign of age.

Distribution.—This species has an extensive range, being found on both banks of the Amazon, Rio Negro, and on the Copataza river ; also in Guiana, Surinam, and Colombia, near Bogotá.

Habits.—Like its congeners, the Common Squirrel-Monkey is arboreal, going about in large flocks. Their food consists of insects and fruits. Mr. Bates observes that the “pretty little *Chrysothrix sciureus* contents itself with devouring what fruit it can on the spot,” thus differing from certain species of *Cebus*, which destroy more than they eat, and when about to return to the forest, carry away all they can in their hands or under their arms.

Mr. Darwin has remarked in his “Expression of the Emotions in Man and Animals,” that “with Monkeys the expression of any painful emotion is not easily distinguished from that of anger.” “Humboldt,” he adds, “also asserts that the eyes of the *Callithrix sciureus* ‘instantly fill with tears when it is seized with fear’; but when this pretty little Monkey in the Zoological Gardens was teased, so as to cry out loudly, this did not occur. I do not, however, wish to throw the least doubt on the accuracy of Humboldt’s statement.”

This species is a great favourite wherever it has been kept in captivity. It is very bright coloured, has a baby-like face, large and bright eyes, and most gentle manners. These Monkeys are very sensitive to cold, and when a sudden fall in the temperature takes place, they huddle close together, clasping each other with their arms, and embracing their neighbours and themselves with their long tails.

IV. THE RED-BACKED TITI. *CHRYSOTHRIX* *ØRSTEDI*.

Saimaris sciurea ? (nec Linn.), Selater, P. Z. S., 1856, p. 139.

Chrysothrix sciurea (nec Linn.), Schl., N. H. Rev., 1861, p. 510 ;

Frantz. Arch. f. Naturg., xxxv. (1), p. 260.

Chrysothrix ørstedii, Reinh. Vidensk. Medd. Nat. For.

Kjöbenh., p. 157, pl. iii. (1872) ; Alston, in Godm. et

Salv., Biol. Centr. Am. Mamm., p. 16, pl. ii. (1879).

Saimiris entomophaga, Selater, P. Z. S., 1872, p. 3 (nec d'Orb.).

Saimiri ørstedii, Schl., Mus. Pays Bas, vii., p. 245 (1876).

Characters.—Differs from *C. sciurea* in having the top of the head black, the back and sides shining red, and the limbs olive.

Distribution.—Panama, Guatemala, Costa Rica, especially their hotter districts,—being particularly abundant in the Valley of Terraba and on the plain of Piris.

THE TITI MONKEYS. GENUS *CALLITHRIX*.

Callithrix, Geoffr., Ann. Mus., xix., p. 112 (1812).

This genus is intermediate between the Squirrel-Monkeys and the typical Night-Monkeys. In the Titis, sometimes known by the name also of Whaiapu-Sai Monkeys, the fur is soft, the head small, depressed, and not produced backward as in *Chrysothrix* ; the tail is long and bushy ; the eyes are small, and the orbits intermediate in size between those of the last and the next genus ; the nasal partition is broad, and the ears large. The canine teeth are small, and the angle of the lower jaw expanded, somewhat as in the Howlers (*Myetes*), though to a less extent.

The Titi Monkeys are diurnal animals, arboreal and gregarious, very lively in disposition, noisy and agile, living on fruit, insects, birds' eggs, and even small birds. They range all over South America, from Panama to the southern limits of the forest regions.

I. THE WHITE-COLLARED TITI. *CALLITHRIX TORQUATA*.

Cebus torquatus, Hoffm., Mag. Ges. Nat. Freund. Berlin, x., p. 86 (1807).

Simia lugens, Humb., Obs. Zool., i., p. 319 (1811).

Callithrix lugens, Geoffr., Ann. Mus., xix., p. 113 (1812).

Saguinus vidua, Lesson, Species Mamm. Bimanes et Quadr., p. 165 (1840).

Callithrix torquatus, Geoffr., t. c. p. 114; Gray, Cat. Monkeys Brit. Mus., p. 55 (1870).

Callithrix torquata, Schleg., Mus. Pays Bas, vii., p. 235 (1876).

Characters.—Head round; face short; ears short, nearly naked; nose flat. Fur soft and woolly, intermixed with many long, stiff, dark reddish-brown hairs,—the hairs red at the base, and black at the tips; forehead black; crown of head dark brown; a narrow band round the face, white; a narrow collar round the neck, reddish-white; hands white; hair of feet red at the base, but black at the tips. Length of the body, about 12 inches.

Distribution.—Confined to the upper reaches of the Rio Negro, Brazil.

Habits.—This species, often known under the name of the Widow Monkey, is said to be very gentle in disposition.

When approaching to capture insects or small birds, which form its prey, it becomes keen and excited, but at other times it appears to be dull and listless. They roam about in flocks of about half a dozen individuals, on the large branches of the great forest trees. They are noisy animals, and in the early morning they make the forest resound with their yelping cries.

II. THE RED TITI. *CALLITHRIX CUPREA*.

Callithrix cuprea, Spix, Sim. et Vesper. Bras., p. 23, pl. 17, (1823); Gray, Cat. Monkeys Brit. Mus., p. 54 (1870); Schleg., Mus. Pays Bas, vii., p. 236 (1876); Thomas, P. Z. S., 1880, p. 394.

Callithrix discolor, Is. Geoffr., C.R., xxvii., p. 498 (1848); id. Cat. Méth. Primates, p. 41 (1851); id. Arch. Mus., v., p. 551, pl. 28; Wagner in Schreb., Säugeth. Suppl., v., p. 114 (1855).

(Plate XIV.)

Characters.—Fur soft and woolly, mixed with numerous long stiff hairs; face black; back grizzly blackish-grey in colour; tail the same but darker; the basal part and tips of the hairs grey, with an intermediate band below the tips, black; tip of the tail sometimes white; the cheeks, throat, hands, feet, legs, and the under side of the body, dark reddish bay; the ears coppery-red.

Distribution.—This species is found throughout the whole of the Peruvian Amazons, though not in very large numbers—indeed, it is said to be rare. It has been recorded from Cashiboya on the Ucayali, and Santa Cruz on the Huallaga. Mr. O. Thomas mentions his having examined twelve specimens from the Copataza river, and one from Andoas in Ecuador.



THE RED TIT.

Of these he says: "The Andoas specimen, which is a male, differs from the rest in having the fur on the back of a dirty orange-grey colour, without annulations, instead of being of a bright annulated black and white. One of the others, a female, shows a tendency to this condition of the hair, which is, therefore, probably a seasonal change, as the Andoan specimen was shot in September, while the others were obtained between December and February."

III. THE WHITE-CHESTED TITI. *CALLITHRIX AMICTA*.

Simia amicta, Humboldt, Obs. Zool., i., p. 357 (1811).

Callithrix amicta, Spix, Sim. et Vespert. Bras., p. 19, pl. xiii. (1833).

Callithrix amictus, Geoffr., Ann. Mus., xix., p. 114 (1812);
Gray, Cat. Monkeys Brit. Mus., p. 54 (1870).

Callithrix torquata, Schl., Mus. Pays Bas, vii., p. 235 (part, 1876).

Characters.—Agrees with the last species in the character of the fur; but the general colour is black, washed with rufous; the forehead is black; the chest has a pure white spot; the hands are white, but the feet black; the tail has the hairs entirely black throughout.

Distribution.—Guiana.

IV. THE REED TITI. *CALLITHRIX CINERASCENS*.

Callithrix cinerascens, Spix, Sim. et Vespert. Bras., p. 20, pl. 14 (1823).

Callithrix donacophilus, d'Orb., Voy. Amér. Sud, iv., p. 10, pl. 5 (1826); Gray, Cat. Monkeys Brit. Mus., p. 55 (1870).

Callithrix donacophila, Geoffr., Cat. Méth. Primates, p. 41 (1851); Schl., Mus. Pays Bas, vii., p. 240 (1876).

Characters.—Fur long and similar in character to that of *C. torquata*; chest and under side of body pale grey or dark reddish-grey; hands and feet grey; back of the same colour; tail mottled grey,—the hairs being grey, with black tips.

In some species the fur varies from dark grey washed with rufous, to almost white, the red wash, where it occurs, sometimes deepening, or almost vanishing.

Distribution.—Mr. Bates observed this species at Serra dos Parentins, in the Lower Amazon Region above the confluence of the Tapajos with the Amazon. It also extends to Bolivia and Peru.

V. THE ORABASSU TITI. CALLITHRIX MOLOCH.

Cebus moloch, Hoffman, Mag. Gesell. Berlin, x., p. 97 (1807).

Callithrix moloch, Geoffr., Arch. Museum, iv., p. 33, pl. 3 (1844),

id., Ann. Mus., xix., p. 114 (1812); Gray, Cat. Monkeys Brit. Mus., p. 55 (1870).

Characters.—Differs from the Reed Titi in having the cheeks, chest, and belly red. Hands and feet of the same colour as the back, grey.

The cerebral convolutions of this animal are, according to M. C. Dareste, exactly those of a "Maki," or *Lemur*.

Distribution.—Throughout Brazil.

VI. THE ORNATE TITI. CALLITHRIX ORNATA.

Callithrix discolor, Verreaux, M.S. (nec Geoffr.).

Callithrix ornata, Gray, Ann. and Mag. Nat. Hist., xvii., p. 57 (1866).

Callithrix ornatus, Gray, Cat. Monkeys Brit. Mus., p. 55 (1870).

Characters.—General colour black and grey, grizzled; forehead and ears white, instead of black as in *C. caligata*, or coppery-red as in *C. cuprea*; temples, cheeks, throat, under side of body, and inner side of legs, bright chestnut; hands and feet grey; tail black, with a grey tinge,—the hairs being grey, with a dark ring near the tip of each; hands and feet the colour of the back.

Distribution.—U. S. Colombia; vicinity of Bogotá.

Habits.—This species is arboreal, like the other members of its genus, and it is said to be nocturnal. It spends the day rolled up very much as many of the Lemurs do.

VII. THE MASKED TITI. *CALLITHRIX PERSONATA*.

Callithrix personatus, Geoffr., Ann. Mus., xix., p. 113 (1812); Spix, Sim. et Vespert. Bras., p. 18, pl. 12 (1823); Gray, Cat. Monkeys Brit. Mus., p. 56 (1870).

Callithrix brunnea, Wagner, Arch. f. Naturg., 1842, i., p. 357 (ex Natterer, MSS.).

Pithecia melanops, Vigors, Cat. Coll. Zool. Soc., p. 6.

Callithrix personata, Schl., Mus. Pays. Bas, vii., p. 231 (1876).

Characters.—Size larger than that of the other Titis. Style of fur the same as in the previous species, but longer, and the long stiff hairs more bristly; general colour black, mottled with grey rings on the hairs; back grizzled grey; entire head, hands, feet, and lower part of limbs, black; chest, under side of the body, and tail dark ashy-grey, the latter washed at the base, sometimes extensively, with rufous, and grey towards the tip below.

Female.—Body strongly washed with whitish-yellow, and the tail with rufous; forehead between the ears, black.

Distribution.—Upper Amazon. Of all the species of the genus, this ranges furthest to the south—to 14° S. lat.

VIII. THE BLACK-FRONTED TITI. *CALLITHRIX NIGRIFRONS*.

Callithrix nigrifrons, Spix, Sim. et Vespert. Bras., p. 21, pl. 15 (1823); Gray, Cat. Monkeys Brit. Mus., p. 56 (1870); Schl., Mus. Pays Bas, vii., p. 232 (1876).

Characters.—Nearly allied to the Masked Titi (*C. personata*), but distinguished by the nearly white back of the head and nape of the neck, and by the hairs at the base of the tail being entirely red.

Distribution.—Upper Amazonia.

IX. THE RED-BELLIED TITI. *CALLITHRIX CASTANEIVENTRIS*.

Callithrix castaneiventris, Gray, Ann. and Mag. N. H., xvii., p. 58 (1866); id., Cat. Monkeys Brit. Mus., p. 56 (1870).
Callithrix caligata, Wagner, Arch. f. Naturg., 1842, i., p. 454 (ex Natterer, MSS.); Schl., Mus. Pays Bas, vii., p. 237 (1876).

Characters.—Fur of the same nature as in *C. cuprea*, black, ringed with grey; face grizzled, whiskers, throat, chest, under side of the body, and inner surface of the limbs reddish-chestnut; outside of the limbs grizzled, washed with rufous; forehead, hands, feet and tail black; tip of the tail paler.

Distribution.—Paraguay and Brazil; Borba, Rio Madeira.

The two following species may be distinguished from those already described by having their soft woolly fur entirely free from the long bristly hairs, which were dispersed through the fur of the others.

X. THE BLACK-HANDED TITI. *CALLITHRIX MELANOCHIR*.

Callithrix melanochir, Neuwied, Beitr., ii., p. 114, et Abbild., iv.; Gray, Cat. Monkeys Brit. Mus., p. 57 (1870); Schl., Mus. Pays Bas, vii., p. 233 (1876).

Characters.—General colour red, but the crown of the head, the throat, and inner side of the limbs, mixed black and grey; the hands and feet black.

Distribution.—This species has been recorded from Bahia, on the east coast of Brazil.

XI. THE GREY TITI. *CALLITHRIX GIGOT*.

Callithrix gigot, Spix, Sim. et Vespert. Bras., p. 22, pl. 16 (1823); Schl., Mus. Pays Bas, vii., p. 234 (1876); Weldon, P. Z. S., 1884, p. 6.

Callithrix gigo, Gray, Cat. Monkeys Brit. Mus., p. 57 (1870).

Characters.—Hair about two inches long, soft and slightly woolly over the trunk; hair on the forehead shorter and more thickly set; that over the limbs short and loose. General colour of the back reddish-grey behind, more ashy over the forehead and limbs; the hair black at the base, cream-coloured further up, the tips ringed with chestnut and black. Muzzle and chin black, with a few short, strong, white hairs; a black line along the nose and round the eyes; the eyelids white; the eye-lashes and long eye-brows black; forehead thickly covered with loose grey hairs, slightly tipped with black; a faint ridge across the brow between the ears; the ears black, covered with soft black hairs, except for a small grey tuft at their hind outer angle. In front of the ears a light grey band over the cheeks, continued above on to the forehead, below to the chest; throat naked, light pink; under surface

of the limbs pale grey ; the hands and feet black ; tail red, the hair bushy at its base. Length of the body, 14 inches ; of the tail, 13½ inches. (*Weldon.*)

Cæcum with dilated end ; liver more divided than in *C. moloch* ; the two halves (*rami*) of the lower jaw enormously deep, resembling those of the Howlers (*Myctes*).

Distribution.—Brazil ; Bahia, and the country between the Parahyba and the mountains to the north of the Bay of Rio de Janeiro.

Habits.—This species is very rare, and nothing is known of its habits.

Professor Weldon writes, in his paper in the "Proceedings of the Zoological Society," referred to above : "Sir W. Flower has suggested to me that the enormous depth of the *ramus* of the mandibles in this *Callithrix* pointed to the existence of some arrangement resembling that of *Myctes*. It was difficult to determine this point in a young female ; but the swollen condition of the thyroid, together with the existence of a patch of ossification on each side, seem to show the possible existence of a howling apparatus in the male."

THE DOUROCOLIS. GENUS NYCTIPITHECUS.

Nyctipithecus, Spix, Sim. et Vespert. Bras., p. 24 (1823).

The members of this genus, usually called "Douroucolis," are small animals, somewhat Lemurine in appearance, possessing a short, thick body, a rounded head produced behind, and a short, round face, encircled by a ruff of whitish fur. The muzzle is not prominent ; the mouth and chin are small ; the

ears are very short, scarcely appearing above the hair of the head; the eyes are enormous and yellowish in colour, imparting to them the staring expression of nocturnal animals of prey. Their tail is bushy, moderately long and non-prehensile; and the nostrils are separated by a narrower partition than in the other genera of the sub-family. Their physiognomy reminds one of an Owl or Tiger-cat (*Bates*). They are covered with close, soft, woolly fur.

In the skull the orbits are enormously large and closely approximated, but yet separated by a complete bony wall; the nostrils, on the other hand, though separated in the living animal by a wide, fleshy partition, have only a thin plate of bone between them. The upper incisors are broad; the canines long; and the lower incisors project forwards, somewhat as in the Lemurs. The arm-bone has a perforation (the ent-epicondylar foramen) on its inner side above the articulation of the elbow joint, to give passage and protection to an important artery and nerve. The thumb is very short; the claws are small and weak. The dorsal and lumbar vertebræ together number twenty-two, the greatest number possessed by any American monkey. As in *Chrysothrix*, the external surface of the cerebral hemispheres is smooth and almost devoid of convolutions, but their inner faces exhibit several of the more important grooves seen in the higher Apes.

All the species are arboreal and nocturnal, hiding away in the daytime and roaming during the night, giving vent to loud howls, or Cat-like cries, as they move in quest of the insects, small birds, and fruits, which form their food. They range from Nicaragua to the Amazon and Eastern Peru, and are called "Devil monkeys" by the Indians. They are very delicate, and soon die in captivity.

I. THE THREE-BANDED DOUROCOLI. NYCTIPITHECUS
TRIVIRGATUS.

Aotus trivirgatus, Humboldt, Obs. Zool., p. 306, fig. 28
(1811).

Nyctipithecus trivirgatus, Gray, Ann. Nat. Hist., x., p. 256
(1842); id., Cat. Monkeys Brit. Mus., p. 58 (1870);
Schl., Mus. Pays Bas, vii., p. 213 (1876).

Characters.—Fur short, grey and brown, with a silvery lustre; on the crown of the head three long black linear streaks, distinct from each other; frontal spot whitish; back greyish-brown with a dark dorsal band and a long chestnut patch; chest and lower surface of body rusty-red; throat, and inside of limbs, greyish-ashy; tail long, cylindrical, and with short, blackish-brown hair, more yellow on the under surface of the base. Length of the body, 12 inches; of the tail, 14 inches.

Distribution.—The type specimen was obtained by Humboldt on the banks of the Cassiquiare, near the head waters of the Rio Negro. Mr. Bates found it at Ega and at other places on the Upper Amazon region. It has been recorded also from Guiana; and from Chanchamayo in Peru, at 3,000 feet above the sea.

Habits.—The habits of the Three-banded Douroucoli are entirely nocturnal. They hide in small troops in a hole in the trunk of a tree from morning till twilight, hunting for food during the night. They have a singularly loud and far-reaching voice for such small animals.

II. THE LEMURINE DOUROCOLI. NYCTIPITHECUS
LEMURINUS.

Nyctipithecus lemurinus, Is. Geoffr., Arch. Mus., iv., p. 24, pl.
21 (1844); Gray, Cat. Monkeys Brit. Mus., p. 58 (1870).

Nyctipithecus felinus, Gray, List Mamm. Brit. Mus., p. 14 (1843); Schl., Mus. Pays Bas, vii., 214 (1876).

Characters.—Fur of body and head long; tail depressed, broad, with the hair bushy and spreading on the sides as in a Squirrel. Head presenting a dark frontal area with a round white spot over each eye.

Distribution.—The Lemurine Douroucolis are found in Colombia and in Upper Amazonia; at Macas, on the eastern side of the Andes; and on the upper branches of the main streams of the Amazon, as far as a congenial habitat is met with.

III. THE RED-FOOTED DOUROCOLI.* NYCTIPITHECUS RUFIPES.

Nyctipithecus rufipes, Sclater, P. Z. S., 1872, p. 3, pl. 1.

Nyctipithecus vociferans, Spix, Sim. et Vespert. Bras., p. 25, pl. 19 (1823; part); Schl., Mus. Pays Bas, vii., p. 214 (1876; part).

(Plate XV.)

Characters.—Above grey, slightly washed on the back with rufous; under side reddish fulvous; three vertical black stripes on the head, similar to *N. trivirgatus*, but much less distinct, narrower, and showing a prominent triangular white patch over each eye; ears large and prominent, almost nude (perhaps the result of captivity). Hands and feet rufous; tail short-haired, cylindrical; the basal half rufous, the remainder reddish-black. Length of the body, 11 inches; and of the tail, 16 inches. The absence of the long chestnut patch on the back distinguishes *N. rufipes* from *N. trivirgatus*, and its paler colour and the indistinctness of its head-stripes, separate it from *N. felinus*.

Distribution.—Nicaragua; San Juan del Norte.

* “Red-footed Night-Monkey,” on plate.

IV. AZARA'S DOUROUCOLI. NYCTIPITHECUS AZARÆ.

Simia azaræ, Humb., Obs. Zool., p. 359 (1811).

Pithecia miriquouina, Geoffr., Ann. Mus., xix., p. 117 (1812);
Kuhl, Beitr., p. 43 (1820).

Nyctipithecus azaræ, Schl., Mus. Pays Bas, vii., p. 212 (1876).

Characters.—A large rhomboidal black patch between the two large superciliary spots, the two acute angles of which are prolonged, the one under the base of the nose, the other in the median line to the top of the head; the inner side of the limbs, the under side of the body, throat, and chin of a reddish-ochre colour.

Distribution.—The right bank of the River Paraguay, in the north-east of the Argentine Republic, but not in Paraguay proper.

V. THE FELINE DOUROUCOLI. NYCTIPITHECUS FELINUS.

Nyctipithecus felinus, Spix, Sim. et Vespert. Bras., p. 24, pl. 18 (1823); Is. Geoffr., Cat. Méth. Primates, p. 39 (1851);
Gray, Ann. N. H., x., p. 256 (1842).

Nyctipithecus oseryi, Is. Geoffr. et Deville, C. R., xxvii., 1848,
p. 498 (juv.); Geoffr., Cat. Méth. Primates, p. 39 (1851).

Nyctipithecus commersonii, Gray, Cat. Monkeys Brit. Mus.,
p. 58 (1870).

Nyctipithecus vociferans, Schl., Mus. Pays Bas, vii., p. 214 (1876; part).

Characters.—Closely related to the last species, but differs in having the three facial streaks irregular and combining together on the crown, the middle one broad and lozenge-shaped; the frontal spots short, and white. Fur longer and more woolly; neck, chest, under surface of body, inner sides of the limbs, and the base of the tail yellowish; tail round.



THE RED-FOOTED NIGHT-MONKEY.

Distribution.—This species is rather rare, but it has been obtained at Ega and at Tabatinga on the Upper Amazons; on the Ucayali, and near Yurimaguas on the Huallaga River—in the warm and humid virgin forests—in fact, generally along the Peruvian Amazons.

In speaking of his collections made at Ega on the Upper Amazons, which he describes as a fine field for a Natural History collector, Mr. Bates gives an interesting account of the Night-Apes, called “Ei-á” by the Indians, observed by him during his various journeys. “Of these I found two species (*Nyctipithecus trivirgatus* and *N. felinus*) closely related to each other, but nevertheless quite distinct, as both inhabit the same forests, namely, those of the higher and drier lands, without mingling with each other or inter-crossing. They sleep all day long in hollow trees, and come forth to prey on insects and eat fruits only in the night. One cannot help being struck by this curious modification of the American type of Monkeys, for the Owl-faced Night-Apes have evidently sprung from the same stock as the rest of the *Cebidæ*, as they do not differ much in all essential points from the Whaiapu-Sais (*Callithrix*) and the Sai-miris (*Chrysothrix*). They have nails of the ordinary form on all their fingers, and semi-opposable thumbs; but the molar teeth (contrary to what is usual in the *Cebidæ*) are studded with sharp points, showing that their nocturnal food is principally insects.

“I kept a pet animal of *N. trivirgatus* for many months, a young one having been given to me by an Indian compadre as a present from my newly-baptized godson. These Monkeys, although sleeping by day, are aroused by the least noise, so that, when a person passes by a tree in which a number of them are concealed, he is startled by the sudden apparition of

a group of little striped faces crowding a hole in a trunk. It was in this way that my compadre discovered the colony from which the one given to me was taken. I was obliged to keep my pet chained up; it, therefore, never became thoroughly familiar. I once saw, however, an individual of the other species (*N. felinus*) which was most amusingly tame. It was as lively and nimble as the *Cebi*, but not so mischievous, and far more confiding in its disposition, delighting to be caressed by all persons who came into the house. But its owner, the Municipal Judge of Ega, Dr. Carlos Mariana, had treated it for many weeks with the greatest kindness, allowing it to keep with him at night in his hammock, and to nestle in his bosom half the day as he lay reading. It was a great favourite with everyone, from the cleanliness of its habits and the prettiness of its features and ways. My own pet was kept in a box in which was placed a broad-mouthed glass jar; into this it would dive, head foremost, when anyone entered the room, turning round inside, and thrusting forth its inquisitive face an instant afterwards to stare at the intruder. It was very active at night, venting at frequent intervals a hoarse cry like the suppressed barking of a dog, and scampering about the room, to the length of its tether, after cockroaches and spiders. In climbing between the box and the wall it straddled the space, resting its hands on the palms and tips of the outstretched fingers with the knuckles bent at an acute angle, and thus mounted to the top with the greatest facility. Although seeming to prefer insects, it ate all kinds of fruit, but would not touch raw or cooked meat, and was very seldom thirsty. I was told by persons who had kept these Monkeys loose about the house, that they cleared the chambers of bats as well as insect vermin. When approached gently, my *Bi-á* allowed

itself to be caressed ; but when handled roughly it always took alarm, biting severely, striking with its little hands, and making a hissing noise like a Cat.

“ I have mentioned the near relationship of the Night-Apes to the Sai-miris (*Chrysothrix*), which are among the commonest of the ordinary Monkeys of the American forests. This near relationship is the more necessary to be borne in mind, as some Zoologists have drawn a comparison between them and the nocturnal Apes of the Lemur family, inhabiting Ceylon and Java, and it might be inferred that our American Ei-ás were related more closely to these Old World forms than they are to the rest of the New World Monkeys. The large nocturnal eyes and short ears of the Eastern Lemurs are simply resemblances of analogy, and merely show that a few species, belonging to utterly dissimilar families, have been made similar by being adapted to similar modes of life. . . . ”

THE SAKIS. SUB-FAMILY PITHECIINÆ.

The Sakis are characterised by having their lower incisor teeth inclined forward at their summits somewhat as among the Lemurs ; and separated from the long canines by an interspace. The molar teeth are small ; the tail, which in some is long, in others short, is non-prehensile. The nostrils are, as usual, far apart, and the thumb is well developed. The ears are large. Great differences in the character of the fur exist in the group : some species having long hair over the whole body, others on the chin and cheeks ; some are well bearded, while others again are quite bald.

The Sakis are divided into two genera, a short-tailed group (*Brachyurus*), containing the Uakari Monkeys, and a long-tailed

section, the Sakis (*Pithecia*). Their various species are restricted to the great equatorial forests of South America.

THE UAKARÍ MONKEYS. GENUS BRACHYURUS.

Brachyurus, Spix, Sim. et Vespert. Bras., p. 11 (1823); W. A.

Forbes, P. Z. S., 1880, p. 644.

Ouakaria, Gray, P. Z. S., 1849, p. 9.

The species of this genus are at once recognised by their short tail, being the only American Monkeys in which this organ is short. The fur is short and silky; the face short, and often brightly coloured. The mammæ are situated on the breast. In the skull the lower jaw is dilated behind, and certain bones, the parietal and the malar, are in contact with each other for a more or less considerable extent on the side walls of the skull. (Cf. W. A. Forbes, P. Z. S., 1880, p. 639, figs. 5 and 6.) In Old World Monkeys this contact *never* (except slightly in *Hylobates*) takes place. This is a useful mark for discriminating between the skulls of New and Old World Monkeys. (*Forbes*.) The shortness of the tail is due, not to a reduction in the number of the vertebræ, which may be 15 to 17, but in their size.

In the brain the cerebrum exhibits the more important grooves characterising the brain of the higher Apes (*Simiidae*) well developed; the cerebellum (or hind brain) is also well developed. Thus in its general characters the brain of the Uakarís approaches most nearly to that of the genera *Cebus* and *Pithecia* (next to be described). By reason of its greater complication and development, it departs widely from that of the Titis (*Callithrix*) and the Squirrel-Monkeys (*Chrysothrix*).

A relationship to the Howlers (*Myætes*), suggested by the external appearance of the Uakarís and the form of their lower

jaw, is not borne out by their internal anatomy. The caudate lobe of the liver is very large. This character distinguishes the whole of the *Cebidæ* from the Old World families.

The Uakarís are arboreal Monkeys, very gentle and timid. The distribution of the various species is singularly restricted, each being confined to a small and particular district.

I. THE BLACK-HEADED UAKARÍ. *BRACHYURUS MELANOCEPHALUS*.

Simia melanocephala (Cacajao), Humboldt, Obs. Zool., p. 317, pl. xxix. (1811).

Pithecia melanocephala, Geoffr., Ann. Mus., xix., p. 117 (1812); Schl., Mus. Pays Bas, vii., p. 227 (1876).

Brachyurus ouakary, Spix, Sim. et Vespert. Bras., p. 12, pl. viii. (1823).

Ouakaria spixii, Gray, P. Z. S., 1849, p. 10, cum fig.

Ouakaria melanocephala, Gray, Cat. Monkeys Brit. Mus., p. 62 (1870).

Brachyurus melanocephalus, W. A. Forbes, P. Z. S., 1880, p. 645, pl. lxiii.

Characters.—Head and nude face-black; back, sides, thighs, upper surface of tail, and outer and inner sides of legs more or less chestnut-brown; shoulders, arms, hands, feet, and rest of tail, black. Ears large, naked, and similar in form to those in Man.

Distribution.—Confined, so far as at present known, to the forests traversed by the Rio Casiquiare, Rio Negro, and Rio Branco. This is the most northern form of the three species of the genus, and apparently the most widespread also (see map, p. 180). This is doubtless the “black-faced, grey-haired” species, neither white nor red, which Mr. Bates was

assured took the place of *B. calvus*, at 180 miles northward from the mouth of the Japurá.

Habits.—Living in the high trees of the forest, feeding on fruits; and not differing in habits from those of the other species of the genus, which are referred to below.

II. THE RED UAKARÍ. *BRACHYURUS RUBICUNDUS*.

Brachyurus rubicundus, Is. Geoffr. and Dev., C. R., xxvii., p. 498 (1848); Is. Geoffr., Arch. Mus., v., p. 564, pl. 30 (1845); Castelnau, Expéd. Amér. Sud, Mamm., p. 19, pl. 4, fig. 2 (1855); W. A. Forbes, P. Z. S., 1880, p. 646, pls. lxi., lxii.

Ouakaria rubicunda, Gray, Cat. Monkeys Brit. Mus., p. 62 (1870).

Pithecia rubicunda, Schleg., Mus. Pays Bas, vii., p. 228 (1876).

Characters.—Face, chin, lips, forehead, and sides of face, bare (except for a few superciliary hairs, and scant representatives of moustache and beard), all bright vermilion red, deepening with emotion. Eyes brown; ears square in shape, without a lobule; hair on top of head short, silky, and grey; that on the side of the lower jaw and throat long and rich chestnut-red, running forward as far as the symphysis, and forming whiskers. Hair of upper surface of body entirely rich chestnut-red, more or less black-tipped and long, especially on the shoulders and limbs; hair of head, nape, and neck paler than on the rest of the body; tail, haired below at tip, rich chestnut-red; under surface of body rich chestnut-red, and less hairy. The fur in general colour and texture resembles that of the Orang, the red hair, continued on to the limbs and tail, being particularly long on the arms and shoulders (forming a sort of cape), and

along the hind border of the thigh and leg. (*IV. A. Forbes*). Between the thigh and the lower part of the leg there is a wide expansion of the skin behind the knee.

The thumb is in the same plane with the other digits and not opposable; digits with compressed and rather elongated nails; the nail of the thumb and the great-toe shorter and more "nail"-like; upper surface of the hands and feet haired, on to the fingers. The cæcum (6 inches) and intestines (22 inches) are absolutely and relatively longer than in any other New World Monkey.

Length of the body, 27-28 inches; of the tail, $6\frac{1}{2}$

Distribution.—Forests on the north bank of the Amazons, opposite Olivença, not passing eastwards of Iça on the Iça river. The exact westward extension of this species still remains unknown. The young specimen seen at Fonteboa by Bates, and by him referred to this species, was more probably *B. calvus*, as we know from the account given by Geoffroy St. Hilaire and Castelnau, that the young of *B. rubicundus* resembles in coloration the adult, and is *not* paler.

Habits.—Gregarious and diurnal; living in the high trees, and feeding on fruits, probably exclusively, the length of its intestines seeming to indicate that it is more of a vegetarian than its allies.

III. THE BALD UAKARÍ. BRACHYURUS CALVUS.

Brachyurus calvus, Is. Geoffr., C. R., xxiv., p. 576 (1847); id., Arch. Mus., v., p. 560 (1845); Castelnau, Expéd. Amér. Sud, Mammif., p. 17, pl. 4, fig. 1 (1855); W. A. Forbes, P. Z. S., 1880, p. 646; Beddard, P. Z. S., 1887, p. 119, pl. xij.

Ouakaria calva, Gray, Cat. Monkeys Brit. Mus., p. 62 (1870).

Pithecia calva, Schl., Mus. Pays Bas, vii., p. 228 (1876).

Pithecia alba, Schl., t. c. p. 229.

(Plate XVI.)

Characters.—Fur very long, straight, and shining from neck to tail. Face scarlet; top of head nearly bald, greyish, passing into brown anteriorly and at the sides, with bushy sandy whiskers meeting below the chin; throat dark brown, mixed with numerous black hairs, the general tint being rich chestnut-brown; back whitish-grey, with black hairs mixed with white ones, which are in greater number. Under surface fulvous brown, darker on the breast, where brown hairs are numerous; the same brown tinge is visible on the arms, legs, the hinder region of the thighs, at the wrist, and ankle, and especially on the tail; eyes reddish-yellow. Length, 18 inches.

Some species are paler than the above description, being pale sandy-white, slightly rufous below and on the inside of the limbs.

Cæcum 10 inches long along its greater curvature, and not sacculated.

According to Mr. Beddard, *B. calvus* and *B. rubicundus* agree very closely in external and in internal characters, while *B. melanocephalus* differs more in external characters from the other two than they do from each other.

Distribution.—Opposite Fonteboa; banks of the Japurá river west of its mouth. This species appears to be confined to the triangle formed by the union of the Japurá river and the Amazon. It does not pass east of Ega, nor does it cross to the south of the Amazon, but keeps to the forests of the low lands to the north of that boundary and south of the Japurá.



THE BALD UAKARI.

Habits.—"This scarlet-faced monkey," says Mr. Bates, "lives in forests, which are inundated during the greater part of the year, and is never known to descend to the ground ; the shortness of its tail is, therefore, no sign of terrestrial habits, as it is in the Macaques and Baboons of the Old World. . . . It seems to be found in no other part of America than the banks of the Japurá near its mouth ; and even there it is confined to the western side of the river. It lives in small troops amongst the crowns of the lofty trees, living on fruits of various kinds. Hunters say it is very nimble in its motions, but it is not much given to leaping, preferring to run up and down the larger boughs in travelling from tree to tree. The mother, as in other species of the Monkey order, carries her young on her back. Individuals are obtained alive by shooting them with the blow-pipe and arrows tipped with diluted Urari poison. They run a considerable distance after being pierced, and it requires an experienced hunter to track them. He is considered the most expert who can keep pace with a wounded one and catch it in his arms when it falls exhausted. A pinch of salt, the antidote to the poison, is then put in its mouth, and the creature revives. . . . Adult Uakarís, caught in the way just described, very rarely become tame. They are peevish and sulky, resisting all attempts to coax them, and biting anyone who ventures within reach. They have no particular cry, even when in their native woods ; in captivity they are quite silent. In the course of a few days or weeks, if not carefully attended to, they fall into a listless condition, refuse food, and die. . . . The bright scarlet of its face is, in health, spread over the features up to the roots of the hair on the forehead and temples, and down to the neck, including the flabby cheeks, which hang down below the jaws. The animal, in this condition, looks at a short distance as

though someone had laid a thick coat of red paint on its countenance. . . . After seeing much of the morose disposition of the Uakari, I was not a little surprised one day, at a friend's house, to find an extremely lively and familiar individual of the species. It ran from an inner chamber straight towards me after I had sat down on a chair, climbed my legs

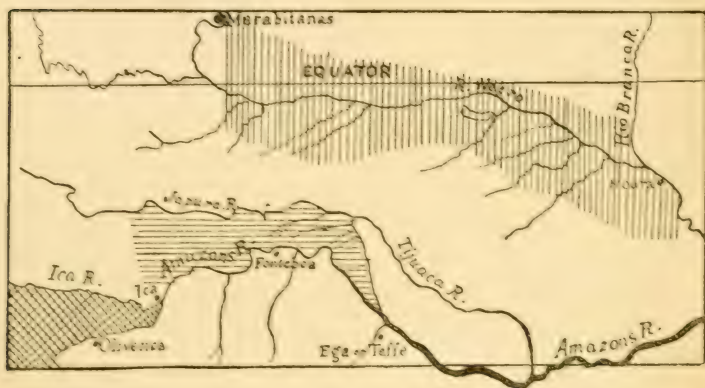





Fig. 8.

Map of part of the basin of the Amazon to show the distribution of the Uakari Monkeys. (Forbes, P. Z. S., 1880, p. 647.)

Supposed area of *B. melanophthalmus*,  Of *B. calvus*, 
Of *B. rubicundus*, 

and nestled in my lap, turning round and looking up with the usual Monkey's grin after it had made itself comfortable. It was a young animal, which had been taken when its mother was shot with a poisoned arrow; its teeth were incomplete, and the face was pale and mottled, the glowing scarlet hue not supervening in these animals before mature age; it had also a few long black hairs on the eyebrows and lips. The

frisky little fellow had been reared in the house among the children, and allowed to run about freely. . . ." This species is rare, even in the limited district which it inhabits. A Government official sent six of his most skilful Indians, who were absent hunting for three weeks before they obtained twelve specimens.

In reference to the singularly restricted range of these Uakaris, Mr. Wallace's observations in his paper "On the Monkeys of the Amazon," before the Zoological Society of London, are of great interest.

"During my residence," he says, "in the Amazon district, I took every opportunity of determining the limits of species, and I soon found that the Amazon, the Rio Negro, and the Madeira formed the limits beyond which certain species never passed. The native hunters are perfectly acquainted with this fact, and always cross over the river when they want to procure particular animals, which are found even on the river's bank on one side, but never by any chance on the other. On approaching the sources of the rivers, they cease to be a boundary, and most of the species are found on both sides of them. Thus several Guiana species come up to the Rio Negro and Amazon, but do not pass them; Brazilian species, on the contrary, reach but do not pass the Amazon to the north. Several Ecuador species from the east of the Andes reach down into the tongue of land between the Rio Negro and Upper Amazon, but pass neither of those rivers, and others from Peru are bounded on the north by the Upper Amazon, and on the east by the Madeira. Thus there are four districts whose boundaries on one side are determined by the rivers I have mentioned. In going up the Rio Negro, the difference on the two sides of the river is very remarkable.

“In the lower part of the river you will find on the north the *Jacchus* [*Hapale*] *bicolor*, and the *Brachyurus couxui* [*Pithecia satanas*], and on the south the red-whiskered *Pithecia*. Higher up you will find on the north the *Ateles paniscus*, and on the south a black *Jacchus* and the *Lagothrix humboldtii*.”

THE SAKIS. GENUS PITHECIA.

Pithecia, Geoffr., Ann. Mus., xix., p. 115 (1812).

Chiropotes, Gray, Cat. Monkeys Brit. Mus., p. 60 (1870), in part.

The Sakis form the second section of the present Sub-family, and are characterised by their long, thick, and bushy non-prehensile tail. A thick beard conceals the large chin. Hair on the crown long, divided by a central line, and hanging over the head, half concealing the pleasing diminutive face, or confined to the head, cheeks, and chin. The ears are large. The upper and lower incisor teeth project forward, the upper inner pair being moderately large, the outer very small; canines strong and conical; first pre-molar smaller than the others, and one-cusped; molars with square crowns, grooved in the middle and slightly four-cusped.

In the brain the whole of the cerebellum and the olfactory lobes are covered by the cerebrum. In general form the latter resembles that of the species of *Cebus*. The frontal and occipital regions of the skull approximate in form to those in Man; the angle of the mandible is expanded, but less so than among the Howlers (*Myctes*). The ribs are relatively broader in this genus than in any other of the American Monkeys.

I. THE HAIRY SAKI. PITHECIA MONACHUS.

Simia monachus, Humb. and Bonpl., Obs. Zool., p. 359 (1811).

Pithecia monachus, Geoffr., Ann. Mus., xix., p. 116 (1812);

Flower, P. Z. S., 1862, p. 326, pl. xxxvii.; Gray, Cat.
Monkeys Brit. Mus., p. 59 (1870).

Pithecia hirsuta, Spix, Sim. et Vespert. Bras., p. 14, pl. 9
(1823).

Pithecia inusta, Spix, t. c. p. 15, pl. x. (1823).

Pithecia irrorata, Gray, Voy. Sulphur, Zool., p. 14, pl. 3 (1844).

Pithecia albicans, Gray, P. Z. S., 1860, p. 231, pl. lxxxi.

Pithecia monacha, Schl., Mus. Pays Bas, vii., p. 220 (1876).

Characters.—Fur harsh, long and loose, with a hood of forwardly-directed hairs on the upper part of the head, neck, and shoulders. Face bare, long, and narrow; nose large and full; nostrils widely separated and lateral. Face dark purplish-brown, and black on the nose, paler round the eyes, and sparingly covered with short coarse whitish hairs; a yellowish-white patch on the cheeks, terminating in front in a distinct line from the inner corner of the eye to below the angle of the mouth; margin of upper lips white; ears large, round, naked, and of the same colour as the face; upper part and back of head, neck, shoulders, back, arms, thighs, and tail, black, washed with yellowish-white, becoming yellowish-brown on the hinder part of the body. Throat, breast, under side of body, and inside of thighs, pale yellowish-brown, sparingly haired. Tail 18 inches long, cylindrical, and bushy at the end; the hair long, coarse, curled, black, washed with pale yellowish-brown. Legs black; fore-arm black, washed with white; upper surface of hands, feet, and digits, white. Hands small, thumbs short, parallel to the other fingers; nails black, somewhat compressed, pointed, that of the thumb flatter; great-toe well developed, standing apart from the other toes, its nail flat

and pointed; nails of the other toes long, curved, and compressed.

Distribution.—Mr. Bates states that the "Parauacú," as this Monkey is called by the natives of its own country, is found on the "terra firma" lands of the north shore of the Solimóens, or Upper Amazon, from Tunantins to Peru. It exists also on the south side of the river on the banks of the Teffé, but there under a changed form, which differs from its type in colours, as much as the red differs from the white Uakarí. This variety is Dr. Gray's *Pithecia albicans*.

Habits.—The Hairy Saki is a very timid and inoffensive animal, and is also, as Mr. Bates tells us in his well-known book, "very delicate, rarely living many weeks in captivity; but anyone who succeeds in keeping it alive for a month or two, gains by it a most affectionate pet. One of the specimens now in the British Museum was, when living, the property of a neighbour of mine at Ega. It became so tame in the course of a few weeks that it followed him about the streets like a dog. My friend was a tailor, and the little pet used to spend the greater part of the day seated on his shoulder whilst he was at work on his board. It showed, nevertheless, great dislike to strangers, and was not on good terms with any other member of my friend's household than himself. . . . The eager and passionate *Cebi* seem to take the lead of all the South American Monkeys in intelligence and docility, and the Coaita, one of the Spider-Monkeys (*Ateles paniscus*), has, perhaps, the most gentle and impressionable disposition; but the Parauacú, although a dull, cheerless animal, excels all in this quality of capability of attachment to individuals of our own species, nor is it wanting in intelligence."

II. THE WHITE-HEADED SAKI. *PITHECIA PITHECIA*.

Simia pithecia, Linn., Syst. Nat., i., p. 40 (1766).

Simia leucocephala, Audeb. Singes., Fam. vi., Sect. i., p. 9, fig. 2 (1797).

Pithecia adusta, Illig., Abh. Berl. Ak., 1804-1811, p. 107; Kuhl, Beitr. Zool., p. 44 (1820).

Pithecia nocturna, Illig., l. c.; Schl., Mus. Pays Bas, vii., p. 217 (1876; part).

Pithecia leucocephala, Geoffr., Ann. du Mus., xix., p. 117 (1812); Gray, Voy. Sulphur, Zool., p. 12, pl. 2; id., Cat. Monkeys Brit. Mus., p. 59 (1870; part); Schl., P. Z. S., 1871, p. 228.

Pithecia ochrocephala, Kuhl, Beitr. Zool., p. 44 (1820, = young).

Pithecia rufibarbata, Kuhl, t. c. p. 44 (1820).

Pithecia capillamentosa, Spix, Sim. et Vespert. Bras., p. 16, pl. 11 (1823).

Pithecia rufiventer, Geoffr., Cat. Méth. Primates, p. 55 (1851); Gray, Cat. Monkeys Brit. Mus., p. 60 (part, 1870); Wagner, Abhandl. Akad. Münch., v., pt. 2, p. 436 (1848: = ♀).

Pithecia chrysocephala, Geoffr., Cat. Méth. Primates, p. 55 (1851).

Pithecia pogonias, Gray, Voy. Sulphur, p. 13, pl. 2 (1844).

Characters.—Male.—Hair black, very long over the body, and especially on the tail. Head with short hair, white, washed with yellow and divided by a central nude black streak; the white hair becoming yellow on the cheeks.

Female.—Greyish-black, washed with pale yellow, the hairs being tipped with the latter colour; moustache yellow; belly red.

Young Male.—Belly rufous brown.

Distribution.—Interior of Demerara, Kaictour Falls; Rio Negro, and Rio Branco in Amazonia; Cayenne; Surinam.

III. THE BLACK SAKI. *PITHECIA SATANAS*.

Saki noir, F. Cuv., Hist. Nat. Mammif., pl. 78.

Simia satanas, Hoffm., Mag. Ges. Berl., x., p. 93 (1807); Humb., Obs. Zool., i., p. 314, pl. xxvii. (1811).

Pithecia satanas, Geoffr., Ann. Mus., xix., p. 115 (1812); Schl., P. Z. S., 1864, p. 712, pl. xli.; id., t. c. p. 138; Schl., Mus. Pays Bas, vii., p. 224 (1876).

Chiropotes cuxio, Lesson, Sp. Mamm. Bimanes et Quadrup., p. 179 (1840).

Chiropotes ater, Gray, Cat. Monkeys Brit. Mus., p. 61 (1870).

Chiropotes satanas, Gray, t. c. p. 61.

Characters.—**Male.**—Fur soft; tail bushy and as long as the body; crown with long black hair arranged on each side, divided by a central line. "The hair of the head sits on it like a cap, and looks as if it had been carefully brushed." (*Bates*.) Long whiskers on each side, and the chin with a moderate beard. Fur black and shining; back sometimes washed with grey or ashy-brown.

Female.—Similar to the male, but having a browner back.

Young.—Beard absent or rudimentary; hair of crown radiating from centre and projecting forwards.

The skull in this species is sometimes ossified into one piece.

Distribution.—Lower Amazonia; Para; British Guiana; the River Orinoco, towards the Rio Negro.

Habits.—Little is known of the habits of the Black Saki, which is also known under the names of "Cuxio" and "Mono

Capuchino." It lives in the most retired parts of the forest, where the ground below it is not inundated by the river, and feeds on fruits.

It is said that this animal—unlike the next species—drinks freely, always bending down on its hands and putting its mouth to the surface of the water, heedless of wetting its beard and indifferent to the observation of onlookers. Sir Robert Porter says that he never saw it take up water in the hollow of its hand, and convey it to its mouth to drink. Its voice is a weak and chirping whistle, which becomes shrill and loud when the animal is angry.

A young male of this species, which died in the Zoological Society's Gardens in 1882, presented an abnormal condition. The peculiarity consisted, as Mr. W. A. Forbes, the late distinguished prosector to the Society, has pointed out in the "Proceedings," in the completely "webbed" condition of the third and fourth digits of the manus (hand) on each side, these two fingers being completely connected together, down to their tips, by a fold of nude skin, and with their nails closely apposed, though not connected along their contiguous margins. The other digits of the hands, as well as those of the feet, were quite normal, the webbing not extending beyond the middle of the first phalanx. Mr. Forbes remarks: "The case is interesting, partly as affording an excellent instance of an abnormal condition affecting homologous parts of opposite sides in an exactly similar way, and partly as showing that the lower Primates are subject, occasionally, to a condition of things which, as is well known, also occurs not at all rarely in Man."

IV. THE RED-BACKED SAKI. *PITHECIA CHIROPOTES*.

Simia chiropotes, Humb., Obs. Zool., i., p. 311 (1811).

Simia sagulata, Traill, Mem. Wern. Soc., iii., p. 167 (1821).

Brachyurus israelita, Spix, Bras., Sim. et Vespert., p. 11, pl. 7 (1823).

Pithecia chiropotes, Geoffr., Ann. Mus., xix., p. 116 (1812); Scl., P. Z. S., 1871, p. 228; Schl., Mus. Pays Bas, vii., p. 223 (1876).

Brachyurus satanas, Gray, List Mamm. Brit. Mus., p. 13 (1843).

Chiropotes sagulata, Gray, Cat. Monkeys Brit. Mus., p. 60 (1870).

Characters.—**Male.**—Larger than *P. satanas*; black, with a reddish-chestnut patch on the back, with a coarse brownish beard, longer than in *P. satanas*; tail very thick, bushy.

Female.—Similar to the male, but without the beard.

Distribution.—Amazonia, Rio Negro, and Rio Branco; Upper Orinoco; British Guiana.

Habits.—This species is said to be solitary, or to go about only in pairs. It derives its scientific name from its habit of drinking by lifting the water to its head with its hands, instead of stooping down and applying its mouth to the water. It is difficult to tame, being fierce and ill-dispositioned.

V. THE WHITE-NOSED SAKI. *PITHECIA ALBINASA*.

Pithecia albinasa, Is. Geoffr. et Dev., C. R., xxvii., p. 498 (1848); id., Arch. Mus., v., p. 559 (1845); Gervais in Castelnau, Expéd. Am. Sud, ii., p. 16, fig. 2 (1855); Scl., P. Z. S., 1881, p. 258, pl. xxix.

Chiropotes albinasa, Gray, Cat. Monkeys Brit. Mus., p. 61 (1870).

(Plate XVII.)

Characters.—Uniformly, but rather sparingly, covered with



THE WHITE-NOSED SAKI.

black hairs. Face black, naked; nose broad and naked, and with a bright scarlet line down its bridge, broadening out on the latter and on the upper lip; tip of nose white, from the presence of a few white hairs.

Long hairs on the head falling to all sides; tail long and clothed to the tip with long hairs hanging down from its under side, slightly prehensile. Length of the body, 15 inches; of the tail, 18 inches.

Distribution.—Amazonia.

Habits.—The White-Nosed Saki, which might much more appropriately have been called the “Red-Nosed Saki,” is very rare; its habits are quite unknown. The type specimen in the Paris Museum remained unique in Europe from 1848 till 1881, when a living specimen was brought to the Zoological Gardens in London.

THE HOWLERS. SUB-FAMILY MYCETINÆ.

This sub-family embraces only one genus, which is very distinct from all the others. The Howlers are the largest of the South American Apes, and are characterised by their thick unwieldy body, their pyramidal head, and small facial angle, owing to their long, somewhat Dog-faced muzzle. The angle of the lower jaw is very large and massive, and their chief characteristic is the conspicuous thickening of the throat, owing to the great enlargement of the hyoid bones—which are widely inflated and cavernous—to form the curious vocal organ which the males of these animals possess, and by which their voice can be so augmented as to be heard at a distance of several miles.* The skull is truncated behind

* See the figures in Flower and Lydekker, *Mammals*, p. 711.

in the male (less so in the female) for the reception of the vocal apparatus. Their incisor teeth are small and equal, the canines are prominent and have an oblique ridge across the crown from the outer front, to the inner hind, cusp, and the upper molars are large. The tail is powerful and prehensile, naked towards the tip, where it is tactile and very sensitive. The thumb is movable, the face is naked, and the chin bearded. Some have short, and some have long, fur over their bodies, but it is generally more plentiful about the head. In appearance they are the most unattractive and repulsive of the American Monkeys. Their intelligence is also of a very low order.

The roof of the brain-case is depressed; the plane of the opening for the passage of the spinal-cord from the brain is almost perpendicular to that of the base of the skull; the condyles for the articulation of the neck are situated as far back as possible. Sir William Flower, in his valuable monograph on the brain of *Myctes*, has shown that the frontal lobes are small and the cerebral hemispheres only just cover the cerebellum. In regard to its grooves and convolutions, the main brain (*cerebrum*) of *Myctes* can be distinguished from that of all other Monkeys. The whole organ is small as compared with the size of the animal; it wants the roundness and fulness of that of the Spider-Monkeys (*Ateles*) and of the Capuchins (*Cebus*). Its surface markings are comparatively few and simple, and depart remarkably from the ordinary type seen in the order. In the Old World Apes there is a striking similarity in the character of the surface markings of their cerebral hemispheres. There is a slight ascensive development from *Cercopithecus* towards *Hylobates*; and further complications overlying the same primitive type—such as large proportionate

size, and complexity of convolutions—are observed in the Chimpanzee and Gorilla, leading up to the brain of Man. Among the New World genera there is a much greater divergence. Among the Capuchins (*Cebus*), and among them only, there is a precise repetition of the Old World type; but in the genus *Myctes* we have modifications in which there is no parallel among the Catarrhine (or Old World) series. There is an absence in its brain of signs of serial elevation; and it exhibits a great dissimilarity to all, even the lowest of the Old World forms, and to those American Monkeys, which in brain-character closely resemble Old World Apes. It shows an affinity in some of its more striking characters to such low forms of New World Apes as *Nyctipithecus*. The low type of brain is in keeping, as Sir William Flower further observes, with their surly and untameable disposition, and with the observation that their intelligence is of a very different order from that of their neighbours, the Spider-Monkeys and Capuchins of higher cerebral organisation.

“When Howlers are seen in the forest,” remarks Mr. Bates, “there are generally three or four of them mounted on the topmost branches of a tree. It does not appear that their harrowing roar is emitted from sudden alarm; at least, it was not so in captive individuals. It is probable, however, that the noise serves to intimidate their enemies.” The muscular power employed in giving vent to their cavernous roar appears to be small. Their food consists chiefly of fruits and leaves.

In colour the Howlers vary very much. The young of both sexes often differ from their parents, and the females from the males, and there is also great individual variation.

The geographical distribution of some of the species is very restricted, several of them being confined to a special district

of the Amazon, into which no other species intrudes. They are found, however, from Eastern Guatemala to Paraguay.

THE HOWLERS. GENUS ALOUATTA.

Alouatta, Lacép., Mém. Inst., iii., p. 490 (1801).

Mycetes, Illig., Prodr. Syst. Mamm., p. 70 (1811).

Stentor, Geoffr., Ann. Mus., xix., p. 107 (1812).

The characters of the genus *Mycetes*, which is the only one of the sub-family, are the same as those given above under the sub-family heading.

The genus contains six well-recognised species. According to Mr. Wallace the red and black species of the Amazon have females of the same colour as the males. Humboldt also remarks, speaking of the thousands of Arguatoes (*M. seniculus*) which he observed in the provinces of Cumana, Caracas, and in Guiana, that he never saw any change in the reddish-brown fur of the back and shoulders, either in isolated individuals or whole troops. Many of the species, however, do have the sexes of quite different colours.

The Howlers are semi-nocturnal in their habits, uttering their cries late in the evening and before sunrise, and also on the approach of rain. (*Wallace.*)

When a *Mycetes* is shot it always hangs to the tree, even if quite dead, and does not fall till the muscles of the feet and tail relax.

The species of this genus range through Central America, Colombia, and the Amazonian region, to Southern Brazil, Bolivia, and Paraguay.

I. THE RED HOWLER. ALOUATTA SENICULUS.

Simia seniculus, Linn., Syst. Nat., i., p. 37 (1766).



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Wynne Jones 1900

THE RED HOWLER.

Alouatta seniculus, Lacép., Mém. de l'Inst., iii., p. 489 (1800).
Stentor ursina (nec fig.), Humb. and Bonpl., Obs. Zool., v.,
 p. 354 (1811).

Mycetes seniculus, Illig., Prod. Syst. Mamm., p. 70 (1811);
 Geoffr., Cat. Méth. Primates, p. 52 (1851); Schl., Mus.
 Pays Bas, vii., p. 156 (1876); Gray, Cat. Monkeys Brit.
 Mus., p. 39 (1870, part.).

Stentor seniculus, Geoffr., Ann. Mus., xix., p. 108 (1812).

Mycetes stramineus, Spix, Sim. et Vespert., Bras., p. 45, pl. 31
 (1823; nec Geoffr.).

Mycetes chrysurus, Geoffr., Mém. Mus., xvii., p. 66 (1829).

Mycetes auratus, Gray, Ann. N. H., xvi., p. 220 (1845); id.
 Cat. Monkeys Brit. Mus., p. 40 (1870).

Mycetes laniger, Gray, Ann. N. H., xvi., p. 219 (1845); id.
 Cat. Monkeys Brit. Mus., p. 40.

Alouatta senicula, Slack, Proc. Acad. Nat. Sci. Philad., 1862,
 p. 517.

(Plate XVIII.)

Characters.—Head, neck, limbs and tail, dark chestnut-brown; back and sides golden-yellow; beard in the full-grown male long, the hair golden-yellow at the root, otherwise chestnut-brown; face naked, black; chest naked, the abdomen sparsely covered with long brown hairs.

The hair of the body is soft. The tail varies in colour in individual specimens, being sometimes, at its termination, of the same colour as the back, and sometimes bright golden-yellow. The *mammæ* are occasionally situated in the *axillæ* (or arm-pits). Length of body, 19½ inches; tail, 20 inches.

Young.—Of the same colour as the parents, only a little darker, the hair hard and rigid.

Distribution.—Brazil ; New Granada ; Venezuela ; Copataza river, Ecuador ; Eastern Peru, along the Ucayali and Huallaga rivers.

Habits.—The Red Howlers always travel in large companies, keeping to the forests of the low lands and shores of the rivers. "We stopped," writes Humboldt, "to observe the Howling Monkeys, which, to the number of thirty or forty, crossed the road by passing in a long file from one tree to another upon the horizontal and intersecting branches." On another occasion the same celebrated naturalist records that "on approaching a group of trees, we perceived numerous bands of Arguatoes going as in a procession from one tree to another with extreme slowness. A male was followed by a great number of females, several of which carried their young on their shoulders. The uniformity with which the Arguatoes execute their movements is extremely striking. Whenever the branches of neighbouring trees do not touch, the male that leads the band suspends himself by the callous and prehensile part of his tail ; and letting fall the rest of his body, swings himself till in one of his oscillations he reaches the neighbouring branch. The whole file performs the same action on the same spot. It is almost superfluous to add how dubious is the assertion that the Arguatoes and other Monkeys with prehensile tails form a sort of chain, in order to reach the opposite side of a river. We had opportunities, during five years, of observing thousands of these animals, and for this very reason we place no confidence in these stories."

"The Arguatoes are sometimes accused of abandoning their young, that they may be more free for flight when pursued by Indian hunters. It is said that mothers have been

seen taking off their young from their shoulders and throwing them down to the foot of the tree. I am inclined to believe that a movement merely accidental has been mistaken for one that was premeditated. The Arguatoes, on account of their mournful aspect and their uniform howlings, are at once detested and calumniated by the Indians."

Mr. Wallace, in a paper "On the Monkeys of the Amazon," in the "Proceedings of the Zoological Society," says: "Humboldt observes that the tremendous noise which these Howlers make can only be accounted for by the great number of individuals that unite in its production. My own observations, and the unanimous testimony of the Indians, prove this not to be the case, one individual alone making the howling, which is certainly of a remarkable depth and volume and curiously modulated; but on closely remarking the suddenness with which it ceases and again commences, it is evident that it is produced by one animal, which is generally a full-grown male."

The flesh of this species is very good to eat, and furnishes the principal food of the inhabitants of the regions in which it abounds.

II. THE BLACK HOWLER. *ALOUATTA NIGRA*.

Stentor caraya, Humb. and Bonpl., Obs. Zool., i., p. 355 (1811 ex Azara).

Myccetes barbatus, Spix, Sim. et Vespert., Bras., p. 46, pls. 32, 33 (1811).

Stentor niger (male), *S. stramineus* (female), Geoffr., Ann. Mus., xix., p. 108 (1812; nec Spix).

Myccetes caraya, Less., Sp. Mamm. Bimanes et Quadrup., p. 122 (1840); Gray, Cat. Monkeys Brit. Mus., p. 41 (part).

Aluatta nigra, Slack, Proc. Acad. Nat. Sci. Philad., 1862, p. 518.

Myocetes niger, Thomas, P. Z. S., 1880, p. 394; Schl., Mus Pays Bas, vii., p. 149 (1876).

Characters.—Male.—Hair rather long and entirely of a deep black; hair on the back of the head directed forward, meeting at right angles that of the forehead, which is directed backward, forming a well-marked semi-circular ridge. Length, 20 inches; tail, 17 inches.

Female and Young.—Pale straw-colour washed with black; the tips of the frontal ridge of hair black; at birth the young are entirely straw-colour.

Dr. Slack observes that, in the young, about the period of the second dentition, the hairs upon the mid-line of the back become black at their bases; soon after, the change takes place upon other parts of the body, the black gradually taking the place of the straw-colour, until the entire body in the adult male is of an intense black colour—the adult female having the coloration of the half-grown male.

Mr. Oldfield Thomas, who examined a specimen collected by Mr. Buckley, in Ecuador, points out that it agreed exactly with Humboldt's original description of the female of his *Simia caraya*, which he describes as having a black head and back, while the sides and belly are yellow. In all recent descriptions, however, the male is described as being nearly uniformly black, and the female uniformly yellow; so that Mr. Buckley's specimen appears to be just such an intermediate specimen as Humboldt described.

According to Prof. Schlegel, adult males sometimes have the black on the hands and feet mixed with yellow.

Distribution.—This is the species of Howler which ranges furthest to the south. It occurs most abundantly in Southern Brazil, Paraguay, and Bolivia, but Mr. Bates records his having obtained a specimen at Villa Nova, on the Upper Amazons, which had come from above Borba, on the Rio Madeira. He did not, however, meet with it on any other part of the Amazon region. Mr. Graham Kerr saw it in troops on the banks of the Pilcomayo river.

Habits.—Like nearly all the Howlers, the present species is of a sulky disposition, in captivity slinking away out of sight when approached. The members of this genus are the only Monkeys which the Indians have not succeeded in taming. They rarely survive their captivity many weeks.

III. THE YELLOW-HANDED HOWLER. *ALOUATTA BEELZEBUL*.

Simia beelzebul, Linn., Syst. Nat., i., p. 37 (1766).

Mycetes rufimanus, Kuhl, Beitr. Zool., p. 31 (1820).

Mycetes discolor, Spix, Sim. et Vespert., Bras., p. 48, pl. xxxiv. (1823).

? *Colobus chrysurus*, Gray, Ann. Nat. Hist., xvii., p. 77 (1866).

Mycetes beelzebul, Gray, Cat. Monkeys Brit. Mus., p. 41 (1870); Schl., Mus. Pays Bas, p. 150 (1876).

Characters.—Black, slightly washed with yellow on the under side of the body and inner side of the limbs; hairs of the body soft, brown at the roots, black at the tips; hands and feet variable, reddish-yellow or reddish-brown, or grey, or black. Upper surface and tip of the tail, spot in front of the ears, and on the knees, reddish-yellow. Length of the body, 17½ inches; tail, 18½ inches.

This species differs from the Black Howler (*A. nigra*) by the

brown colour of the roots of the hair ; and from the species next to be described—the Brown Howler (*A. ursina*)—by the length of the fur and the absence of the reddish-brown tips to the hairs.

Distribution.—Apparently confined to the Lower Amazon, in the vicinity of Para.

Habits.—The same as those of the species already described.

IV. THE BROWN HOWLER. *ALOUATTA URSINA*.

Stentor ursina, Humb. and Bonpl., Obs. Zool., i., pl. 30 (fig. nec descr. ; 1811).

Stentor flavicauda, Id. t. c. p. 355 (1811).

Stentor ursinus, Geoffr., Ann. Mus., xix., p. 108 (1812).

Stentor fuscus, Geoffr., t. c. p. 108 (1812).

Myctes fuscus, Kuhl, Beitr. Zool., p. 29 (1820) ; Spix, Sim. et Vespert., Bras., p. 43, pl. 30 (1823).

Myctes bicolor, Gray, Ann. N. H., xvi., p. 214 (1845) ; id. Cat. Monkeys Brit. Mus., p. 40 (1870).

Myctes ursinus, Is. Geoffr., Cat. Méth. Primates, p. 55 (part., 1851) ; Gray, Cat. Monkeys Brit. Mus., p. 39 (1870) ; Schl., Mus. Pays Bas, vii., p. 155 (1876).

Aluatta ursina, Slack, Proc. Acad. Nat. Sci. Philad., 1862, p. 517.

Myctes flavicauda, Schl., t. c. p. 147 (part., 1876).

Characters.—General colour shining yellowish-red, or dark brownish-yellow ; hairs rather rigid, black with yellowish tips ; hairs of the shoulder ringed with black. When half-grown the limbs and tail are very dark brown, nearly black ; tail shorter than the body, olive black, with two yellow lateral stripes. Length of the body, 23 inches ; of the tail, 22 inches.

Young.—Black, with the tips of the hairs of the body yellowish-brown; base of the tail and the surrounding region reddish-brown.

This species is remarkable for great variation in colour. The young at first sight, as Dr. Slack has pointed out, appear to be of an intense black colour, but upon a closer examination, the hairs, more especially those of the back and sides of the head, are found to be tipped with reddish-brown. As the animal becomes older the black gradually vanishes, a yellowish-brown colour appearing in its place, until in the adult the only remains of the black are to be found in a few annulations in the hairs of the shoulders.

The skins are an article of commerce, for saddle cloths and saddle coverings.

Distribution.—The Rio Negro and Upper Amazonia. Mr. Bates remarks that this is the only species seen in this region.

V. THE GUATEMALAN HOWLER. *ALOUATTA VILLOSA*.

Myctes villosus, Gray, Ann. Nat. Hist., xvi., p. 220 (1845); id. Cat. Monkeys Brit. Mus., p. 41 (1870); Sclater, P. Z. S., 1872, p. 5, figs. 1 and 2; Alston, in Godm. and Salvin, Biol. Centr. Amer. Mamm., pp. 3 and 5, pl. i.

Characters.—Differs from *M. niger* by its abundant, long, and soft hairs, which below, towards their bases, show a rufescent tinge, and by the frontal hairs being *sometimes* directed downwards at the base, instead of upwards; hair on cheeks under the ears, brownish.

Male.—Entirely black.

Female and Young.—Also quite black, like the adult male, in-

stead of being pale yellow, like the corresponding age and sex of *A. nigra*, and having also the hair shorter and not so glossy.

Distribution.—This Howler is known only from the virgin forests of the eastern and north-eastern portions of Guatemala. Mr. Osbert Salvin has given the following account of this species. "The *Myctes* of Guatemala is commonly known as the 'Mono.' It is abundant throughout the virgin forests of the eastern portion of the Republic, but is unknown on the forest-clad slopes which stretch towards the Pacific Ocean. In the former region it is found at various altitudes over a wide expanse of country. I have heard its cry on the shores of the lake of Yzabal; and all through the denser forests of the valley of the River Polochic it is very common, from the steep mountain road which lies between the upland village of Purulá and S. Miguel-Tucuru, and especially in the wilderness of uninhabited forest, which stretches from Telemán to the lake of Yzabal. In the unbroken forest-country which occupies the whole of the northern portion of Vera Paz, from Cobán and Cahabón to the confines of Petén, it is also abundant; for seldom an hour passes but the discordant cry of the Mono strikes upon the ear of the traveller, as he threads the lonely path to Petén. The elevation of this district varies from 700 to 3,000 feet, and the *Myctes* is found at all elevations. When travelling through the forest in 1862, I was dependent for the animal food, to supply my party of Indians, entirely upon my gun, and Monos contributed not a little to the larder. The Indians eat Monkey without demur, but the meat looks dark and untempting. For my own part I far preferred the delicate Tinamou or Curassow, a sufficient supply of which never failed for my own consumption. Perhaps there is no district in Vera Paz where Monos are more abundant than the mountains of

Chilasco, a cold and damp region, elevated at least 6,000 feet above the sea, but where the forest-growth is of the densest description and trees of the largest size abound. It was here that the specimens were obtained that are now in the British Museum."

Habits.—These animals are found in small companies of five or six. They are usually met with on the upper branches of the highest trees, and when disturbed crawl sluggishly along the boughs. "The wonderful cry whence *Myctes* gets its trivial name of Howling Monkey is certainly most striking; and I have sometimes endeavoured to ascertain how far this cry may be heard. It has taken me an hour or more to thread the forest undergrowth from the time the cry first struck my ear to when, guided by the cry alone, I stood under the tree where the animals were. It would certainly not be over estimating the distance to say two miles. When the sound came over the lake of Yzabal, unhindered by trees, a league would be more like the distance at which the Mono's cry may be heard." (*O. Salvin.*)

To this species, we believe, belongs the following description given by Captain Dampier: "The Monkeys that are in these parts are the ugliest I ever saw. They are much bigger than a Hare, and have great Tails about two Foot and a half long. The under side of their Tails is all bare, with a black hard Skin; but the upper side and all the Body is covered with coarse, long black staring Hair. These Creatures keep together, twenty or thirty in a company, and ramble over the Woods, leaping from Tree to Tree. If they meet with a single Person they will threaten to devour him. When I have been alone I have been afraid to shoot them, especially the first Time I met them. They were a great company, dancing

from Tree to Tree over my Head ; chattering and making a terrible Noise ; and a great many grim Faces, and shewing antick Gestures. Some broke down dry Sticks and threw at me ; . . . at last one bigger than the rest came to a small Limb just over my Head ; and leaping directly at me made me start back, but the Monkey caught hold of the Bough with the tip of his tail ; and there continued swinging to and fro, and making mouths at me. . . . The Tails of these Monkeys are as good to them as one of their hands ; and they will hold as fast by them. . . . The Females with their young ones are much troubled to leap after the Males ; for they have commonly two : one she carries under one of her Arms, the other sits on her Back, and clasps her two Fore-Paws about her Neck. These Monkeys are the most sullen I ever met with, for all the Art we could use would never tame them. . . . These Monkeys are very rarely or (as some say) never on the Ground."

VI. THE MANTLED HOWLER. *ALOUATTA PALLIATA*.

Mycetes palliatus, Gray, P. Z. S., 1848, p. 138, pl. vi. ; Frantz., Wieg. Arch., xxxv., p. 254 (1869) ; Gray, Cat. Monkeys Brit. Mus., p. 40 (1870) ; Schl., P. Z. S., 1872, p. 7 ; Schl., Mus. Pays Bas, vii., p. 152 (1876) ; Alston, in Godm. and Salvin, Biol. Centr. Am. Mamm., p. 4 (1879).

Aluatta palliata, Slack, Proc. Acad. Nat. Sci. Philad., 1862, p. 519.

Characters.—Face naked ; hair of forehead short, reflexed, forming a slight crest across the middle of the head ; hairs of the back of the head rather longer ; those of the cheeks few, short and grey ; those of the fore neck lengthening into a short beard. General colour brownish-black ; middle of back and

upper part of sides, yellowish-brown ; lower part of sides brownish-yellow, lengthened into a mantle ; arms, legs, and tail black. Length, $19\frac{1}{2}$ inches ; tail, $20\frac{3}{4}$.

The late Mr. Alston, in describing the Mammals of Central America, in Messrs. Godman and Salvin's monumental work, "Biologia Centrali-Americana," observes that "this Howler presents considerable variety in the depth of the black or brown-black ground-colour, and in the extent of the fulvous tints of the flanks and loins. Dr. v. Frantzius states that the Howlers which he saw in Costa Rica were darker than is indicated by Dr. Gray's description ; and in several of the Panama examples the light markings are much reduced, but in others they are quite as conspicuous as in the Nicaraguan types." Mr. Alston, therefore, agrees with Prof. Schlegel, that the variation does not depend on locality.

Distribution.—Shores and islands of the lake of Nicaragua ; Costa Rica ; Panama ; Islet of Hicaron, at the southern extremity of Quibo Island, off the Coast of Veragua. South of the Isthmus of Panama, the Red Howler (*A. senicula*) replaces the Mantled Howler.

Habits.—The habits of the Mantled Howler do not differ widely from those of the species already described. It prefers the highest branches of the trees of the dense forests ; and is harmless to the plantations of the natives. In disposition it is dull and melancholy, and is rarely kept in confinement. It is said, however, to reconcile itself to captivity more than some of the others referred to in previous pages. According to Dr. v. Frantzius, a tame male individual of this species was observed to howl whenever rain-clouds gathered, and also regularly at five o'clock every morning.

THE CAPUCHINS AND SPIDER-MONKEYS.
SUB-FAMILY CEBINÆ.

We now come to describe the remaining Monkeys of the New World. The *Cebinæ* are characterised by having the incisors vertical, not procumbent ; they have no inflated hyoid bone as in the foregoing Sub-family. The tail in all is long and prehensile, although in some species it is a less perfect grasping organ, being clothed with hair to the tip, instead of being there naked and highly sensitive. The thumb may be present or absent.

This Sub-family contains four genera : the Capuchins (*Cebus*) ; The Woolly Monkeys (*Lagothrix*) ; the Woolly Spider-Monkeys (*Eriodes*) ; and the Spider-Monkeys (*Ateles*). The species belonging to these genera are very numerous, and are found over the whole region from Mexico in the north, to Paraguay and Bolivia in the south, or from about 25° N. lat., to 30° S. lat.

THE CAPUCHINS. GENUS CEBUS.

Cebus, Erxleb., Syst. Regne Anim., p. 44 (1777).

This is the typical genus of the American Monkeys. They are distinguished by having a robust body, covered with woolly fur, with a rounded head and a face which, instead of having a protruding muzzle, is more erect and Man-like. They are the commonest Monkeys seen in captivity in our streets. Their tail is long and covered with hair to the tip, and, though prehensile, it is not the perfect substitute for an additional hand noticed in several other genera. Their limbs are only moderately long, and are less slender than in the Spider-Monkeys. The fore-limbs have a well-developed thumb, which, as compared with the length of the hand, is the most

Man-like of all the Apes ; in some species the nails of the digits are compressed laterally.

In the skull the cranial portion exceeds the facial. Professor Mivart observes that in this group the facial part is relatively smaller than in many of the higher Old World Apes. The skull has no external bony canal (or *meatus*) to the ear ; and its frontal bones possess large air-cavities. In the Capuchins the incisor teeth are erect, and are always shorter than the canines. The molars are four-cusped, and have, on their crowns, two transverse ridges and the oblique ridge, already described in the *Lemuroidea*, from the front inner cusp to the hind outer cusp. These animals have also one milk-molar tooth more than in Man.

The outer surface of the main brain (*cerebrum*) is almost as much convoluted as in the Old World Apes.

The Capuchins range from Costa Rica to Paraguay, and are represented by about eighteen species. They are very gentle and docile animals.

F. Cuvier observes in his "Histoire Naturelle des Mammifères," that of all the Quadrumana—indeed, of all the Mammals—there are none so difficult to characterise as the Capuchins of America, whose colours vary almost with every individual. No two authors agree in the number of species the genus contains. Brisson recognised three, Linnaeus four, Gmelin six, Buffon two, and George Cuvier supposed it possible that they all belonged to but one species. Two causes help to produce this diversity of opinion ; one is, as remarked above, the natural disposition which these animals have to vary, and to become lighter or darker in colour according to circumstances, and the other is the extremely close relationship that exists between the different species of the genus. Observations, how-

ever, are not yet numerous enough, nor exact enough, to enable those who have only studied the species alive in Europe, or had skins, to decide with such imperfect data as to their sex, age, and habitat. Not until some naturalist has made a prolonged study of these animals in their native country, and watched their conduct and relations in the living state, can we hope to attain to any certain knowledge of how many species the genus contains ; and of the differences between the old and young of both sexes at different periods from youth to age.

I. THE WHITE-THROATED CAPUCHIN. *CEBUS HYPOLEUCUS*.

Sai á gorge blanche, Buffon, Hist. Nat. Mamm., p. 64, pl. 15, fig. 9 (1767); Fr. Cuv., Hist. Nat. Mamm., livr. xvi.; Audeb., Hist. Nat. Singes, fam. v., sect. 2, pl. 5 (1797).

Simia hypoleuca, Humb., Obs. Zool., i., p. 337 (1811); Pucher., Rev. et Mag. de Zool. (2), 1857, p. 348.

Cebus hypoleucus, Geoffr., Ann. Mus., xix., p. 111 (1812); Gray, Cat. Monkeys Brit. Mus., p. 50 (1870); Schl., Mus. Pays Bas, vii., p. 190 (1876).

Cebus leucocephalus, Gray, P. Z. S., 1865, p. 827, fig. 4; Slater, P. Z. S., 1872, p. 4; Alston in Godman and Salvin, Biol. Centr. Am. Mamm., p. 13 (1879).

Characters.—Hair very silky, smooth and stiff, and thicker above than below. Face and forehead nude, flesh-coloured; hands and feet nude, of a violet hue, as also the thinly-haired skin of the under side of the body. The tip of the tail for a short distance being naked, distinguishes this species from all others. Shoulders, arms, and sides of the head behind the ears pure white ; chest and throat yellowish ; rest of the body deep black.

Older individuals have the head longer than the younger ones, and the shoulders yellowish instead of white. Length of the body, $13\frac{1}{2}$ inches ; of the tail, 17 inches.

Distribution.—This species was discovered by Humboldt in the low lands of Colombia. From Colombia its range extends north to Nicaragua. It has been obtained in Veragua, in Panama, in Costa Rica, and in the north-east of the country between the Pacuar and Chirripo rivers, and also on the mountains of Candalaria.

Habits.—The White-throated Capuchin feeds partly on fruit, as Mr. Belt has narrated in his well-known "Naturalist in Nicaragua." He adds :—"It is incessantly on the look out for insects, examining the crevices in trees and withered leaves, seizing the largest beetles and munching them up with the greatest relish. It is also very fond of eggs and young birds, and must play havoc amongst the nestlings. Probably owing to its carnivorous habits, its flesh is not considered so good by Monkey-eaters as that of the fruit-eating Spider-Monkey ; but I never myself tried either."

Mr. Salvin saw a troop of these Monkeys in company with several Spider-Monkeys by the margin of a watercourse in Nicaragua, and remarked that the actions of the latter were bolder and more active than those of the Capuchins, which were slower and more timid.

According to Cuvier, the cry of this animal in captivity is a continuous soft whistle until its wants are satisfied ; if it wants nothing this whistle is intermittent, and very soft. When in terror, its cry is a veritable bark, broken by silent intervals.

It is extremely docile and very intelligent ; the look in its eyes is remarkably penetrating, and it appears to read in the

eyes of its observer what is passing within him, and to comprehend every motion and gesture.

When pleased it utters a reiterated shrill note, and draws back the corners of its mouth, producing a smile by contracting the same muscles as in the human face.

II. THE WHITE-CHEEKED CAPUCHIN. *CEBUS LUNATUS*.

Cebus lunatus (Sajou cornu), male; F. Cuv., Hist. Nat. Mamm., pl. 70 (nec Kuhl).

Cebus zellerosus, Is. Geoffr., Cat. Méth. Primates, p. 44 (1851, pt.).

Cebus leucogenys, Gray, P. Z. S., 1865, p. 824, pl. xlv.; id. Cat. Monkeys Brit. Mus., p. 48 (1870).

Cebus frontatus, Schl., Mus. Pays Bas, vii., p. 206 (1876).

Characters.—Fur soft, elongate, silky, with thick under-fur. Hair on front of head elongate and reflexed, forming across the brow a short crest, higher above each eye; hair on top of head lying flat; that on cheeks short and adpressed; base of nose large, and corrugated longitudinally; toes long; tail longer than in other species; under surface of body less haired.

General colour silky brown, almost black on the head and limbs, paler on the shoulders and arms; the whiskers forming a white, or sometimes pale yellow, band, bordering the cheeks from opposite the eyes to the chin. Face and hands naked, violet; skin below the hair of the same colour.

The hair of the body is longer in winter than in spring: but the crests, or "horns," and the white whiskers appear only when the animal is fully adult.

Distribution.—Brazil.

III. THE SLENDER CAPUCHIN. *CEBUS FLAVUS*.

Cebus barbatus, Geoffr., Ann. Mus., xix., p. 110 (1812); Schl.,

Mus. Pays Bas, vii., p. 197 (1876).

Cebus albus, Geoffr., t. c. p. 112 (albino).

Cebus flavus, Geoffr., Ann. Mus., xix., p. 112 (1812); Kuhl, Beitr. Zool., p. 33 (1820); d'Orbig., Voy. Amér. Mérid., iv., Mamm., p. 1, pl. 3 (1847); Schl., Mus. Pays Bas, vii., p. 204 (1876).

Cebus gracilis, Spix, Sim. et Vespert., Bras., p. 8, pl. 5 (1823, young).

Cebus libidinosus, Spix, t. c. p. 5, pl. 2 (1823).

Cebus unicolor, Spix, t. c. p. 7, pl. 4 (1823).

Simia flavia, Schreb., Säugeth., pl. 31B (1840).

Cebus elegans, Is. Geoffr., C. R., xxxi., p. 875 (1850).

Caiarara branca, Bates, Nat. Amaz., ii., p. 100 (1863).

Cebus pallidus, Gray, Cat. Monkeys Brit. Mus., p. 49 (1870).

Characters.—Hairs of crown short and reflexed, forming a small short crest, separated by a median furrow on each side of the dark crown patch. Fur soft; the coronal patch on the back of the head small, black or brown; crest black.

General colour golden fulvous or greyish fulvous; limbs and tail dark brown; beard golden-red.

Varieties of this species are sometimes entirely fulvous, with the forehead white; others are entirely albino.

Distribution.—Bolivia.

IV. THE SMOOTH-HEADED CAPUCHIN. *CEBUS MONACHUS*.

Cebus monachus, F. Cuv., Hist. Nat. Mammif., livr. xix. (1820).

Le Saï a grosse tête, male, F. Cuvier, *loc. cit.*

Cebus xanthocephalus, Spix, Sim. et Vespert., Bras., p. 6, pl. 3 (1823); Gray, Cat. Monkeys Brit. Mus., p. 50 (1870).

Cebus cucullatus, Spix, t. c. p. 9, pl. 6 (1823).

Cebus olivaceus, Wagner in Schreb. Säugeth., Suppl., v., p. 87, pl. 8 (1855).

Cebus variegatus, Schl., Mus. Pays Bas, vii., p. 208 (1876).

(Plate XIX.)

Characters.—Fur soft and stiff. Head large and round covered with short recumbent hairs. Face naked, pale round the prominent eyes; muzzle sharp, and of the same colour as that which surrounds the eyes; forehead, temples, throat, chest, under surface of body, sides of jaws, and front of arms, pale orange-yellow; outer side of arms, pale orange, washed with white; fore-arms, rump, hind-limbs, and tail black; a mixture of black and brown, expanding irregularly into spots on the yellow, covering the back, shoulders, and sides of body; a spot on the crown, black; a superciliary ridge forming a band of whiskers extending down the cheeks, and meeting under the chin, also black. Hands naked, violet, almost black.

Varieties occur with the shoulders and loins pale yellow, instead of mixed black and brown, and the outside of the thighs and the base of the tail, reddish. In some specimens the pale yellow of the back gives place to a white ground.

Distribution.—Rio de Janeiro, Brazil; Paraguay (?); Guiana.

Habits.—Little is known of the habits of this species; but F. Cuvier, who had one under his care in the “Ménagerie Royale,” in Paris, remarks that it had the confiding disposition characteristic of the Capuchins, although very timid. It exhibited a great desire to be caressed, was very affectionate and most intelligent. Its physiognomy, however, he says, was involuntarily repellent, being one that, among ourselves, would indicate a person steeped in ignorance and sensuality.



SMOOTH-HEADED CAPUCHIN.



V. THE BROWN CAPUCHIN. *CEBUS FATUELLUS*.

Simia trepida, Linn., Syst. Nat., i., p. 39 (1766).

Simia apella, Linn., Syst. Nat., i., p. 42 (1766).

Simia fatuellus, Linn., Syst. Nat., i., p. 42 (1766).

Cebus fatuellus, Geoffr., Ann. Mus., xix., p. 109 (1812).

Cebus apella, Geoffr., t. c. p. 109 (1812); Gray, Cat. Monkeys Brit. Mus., p. 48 (1870); Schl., Mus. Pays Bas, vii., p. 199 (1876).

Cebus macrocephalus, Spix, Sim. et Vespert., Bras., p. 3, pl. 1 (1823).

Characters.—Fur thick, harsh; hair of crown short, reflexed; on the sides of the crown a dark spot, elongated and elevated into two longer or shorter crests, according to the season and the age of the animal. General colour reddish-brown, darker on the hind-limbs, tail, and middle of the back; fore-arms, crown-spot, and whiskers, black; front of shoulders greyish or yellow; Face naked, purplish flesh-colour.

This species is subject to great individual variation. Its general colour is sometimes pale yellowish, with the whiskers yellow.

Distribution.—Brazil; Guiana, near the coast; on the mountains of the Upper Magdalena Valley; Tolima, U.S. Colombia, from 5,000 to 7,000 ft.

Habits.—This species, called “Mico Maizero” by the inhabitants of Tolima, lives as all the *Cebi* do, in considerable troops in the forests. When wild, it is restless and destructive, but in captivity it is docile and affectionate.

VI. THE VARIEGATED CAPUCHIN. *CEBUS VARIEGATUS*.

Cebus variegatus, Geoffr., Ann. Mus., xix., p. 111 (1812).

Characters.—Head round; muzzle protruding. Fur black, ringed with golden-yellow; under side of body rufous. Hairs of back brown at base, red higher up, black at the tips.

Distribution.—Brazil.

VII. THE TUFTED CAPUCHIN. *CEBUS CIRRIFER*.

Le Sajou negre, Buffon, Hist. Nat. Mamm. Suppl., p. 109, pl. 28.

Cebus cirrifer, Geoffr., Ann. Mus., xix., p. 110 (1812); Gray, Cat. Monkeys Brit. Mus., p. 49 (1870).

Cebus cucullatus, Spix, Sim. et Vespert., Bras., p. 9, pl. 6 (1823, juv.).

Macaco prego, Bates, Nat. Amazon., i., p. 323 (1863).

Cebus niger, Schl., Mus. Pays Bas, vii., p. 202 (1876).

Characters.—Head round; hairs of crown short and reversed, sometimes elongated into two retrorsal tufts. Fur short, close, and in general colour maroon, turning to black, darker on the under surface; face, chin, sides of forehead and a streak above the eyebrows, yellowish-white.

Distribution.—Lower Amazon region.

Habits.—Little is known of this Monkey beyond what Mr. Bates has told us, viz., that it is a great depredator of the fruit trees. "It is a most impudent thief; it destroys more than it eats by its random, hasty way of plucking and breaking the fruits, and when about to return to the forest, carries away all it can in its hands or under its arms."

VIII. THE CRESTED CAPUCHIN. *CEBUS ROBUSTUS*.

Cebus robustus, Kuhl, Beitr. Zool., p. 35 (1820, ex Neuwied MSS.); Is. Geoffr., Cat. Méth. Primates, p. 43 (1851); Gray, Cat. Monkeys Brit. Mus., p. 51 (1870).

Cebus frontatus, Kuhl, Beitr. Zool., p. 34 (1820); Schl., Mus. Pays Bas, vii., p. 206 (1876, part).

Cebus variegatus, Schl., Mus. Pays Bas, vii., p. 208 (1876, part).

Characters.—Crown with hairs elongated into a conical central crest. Fur bright red; crown bright red like the back, with a black spot.

Distribution.—Brazil.

IX. THE GRIZZLED CAPUCHIN. *CEBUS ANNELLATUS*.

Cebus annellatus, Gray, P. Z. S., 1865, p. 827, fig. 3; id. Cat. Monkeys Brit. Mus., p. 51.

Characters.—Hair of crown long and erect, forming a central conical crest. Fur brown, reddish-washed, especially on the thighs, the hairs with several pale rings; a streak on the sides of the neck bent down on the front of the shoulders, yellow; belly reddish; crown, temples, whiskers, outer and inner side of the limbs and tail, black; hair of face deep black; crown-spot broad, with a broad line to the forehead and another, on each side, to the whiskers.

Distribution.—Brazil.

X. THE WHITE-FRONTED CAPUCHIN. *CEBUS ALBIFRONS*.

Simia albifrons, Humb., Obs. Zool., p. 323 (1811).

Cebus chrysopes (Le Sajou à pieds dorés), Fr. Cuv., Hist. Nat. Mammif., pl. 51 (part.).

Cebus albifrons, Is. Geoffr., Ann. Mus., xix., p. 111 (1812); Gray, Cat. Monkeys Brit. Mus., p. 50 (1870); Schl., Mus. Pays Bas, vii., p. 195 (1876, part.)

Cebus leucocephalus, Gray, t. c. p. 50.

Cebus versicolor, Pucher., Rev. Zool., 1845, p. 335 (part).

Characters.—Head large in proportion to the body. Hair of crown short, reflexed, without crest or “horns.” Tail with rather long hair. Face, forehead, throat, shoulders, and crest white. General colour of body light or reddish-brown; back and outer side of the limbs, brownish-red.

Distribution.—Generally distributed through the forests of the level country of the Upper Amazon.

Habits.—The Caiarara, as the Tupi Indians name this species, lives in troops in the forests and feeds on fruits. Mr. Bates, who kept one in captivity for a considerable period during his stay in the Upper Amazon region, describes it as “a most restless creature, but not playful like most of the American Monkeys; the restlessness of its disposition seeming to arise from great nervous irritability and discontent. The anxious, painful, and changeable expression of its countenance, and the want of purpose in its movements, betray this. Its actions are like those of a wayward child; it does not seem happy even when it has plenty of its favourite food, bananas; but will leave its own meal to snatch the morsels out of the hands of its companions. It differs in these mental traits from its nearest kindred, for another common *Cebus*, found in the same parts of the forest, the Prego Monkey (*C. cirrifer*), is a much quieter and better tempered animal. . . . The Caiarara [called Ouavapavi, by Humboldt] is always making some noise or other, often screwing up its mouth and uttering a succession of loud notes resembling a whistle.” It is the most wonderful leaper of the whole tribe. Mr. Bates has also recorded:—“The troops consist of thirty or more individuals which travel in single file. When the foremost of the flock reaches the outermost branch of an unusually lofty tree he springs forth

into the air without a moment's hesitation and alights on the dome of yielding foliage belonging to the neighbouring tree, maybe fifty feet beneath; all the rest following the example. They grasp, on falling, with hands and tail, right themselves in a moment, and then away they go along branch and bough to the next tree." Mr. Belt also mentions having kept a White-fronted Capuchin in captivity for a long time. Its actions, he tells us, were very human-like. "He had quite an extensive vocabulary of sounds, varying from a gruff bark to a shrill whistle; and we could tell by them, without seeing him, when it was he was hungry, eating, frightened, or menacing; doubtless one of his own species would have understood various minor shades of intonation and expression that we, not entering into his feelings and wants, passed over as unintelligible."

XI. THE WEEPER CAPUCHIN. *CEBUS CAPUCINUS*.

Simia capucina, Linn., Syst. Nat., i., p. 42 (1766).

Cebus capucinus, Geoffr., Ann. Mus., xix., p. 111 (1812); Gray, Cat. Monkeys Brit. Mus., p. 49 (1870); Schl., Mus. Pays Bas, vii., p. 19 (1876).

Cebus nigrovittatus, Wagner, Acad. Münch., v., p. 430 (1847, ex Natt. MSS.).

Cebus olivaceus, Schomb., Reis. Brit. Guiana, ii., p. 246, et iii., p. 770 (1848).

Cebus castaneus, Is. Geoffr., Cat. Méth. Primates, p. 46 (1851).

Cebus versicolor, Pucher., Rev. et Mag. Zool., 1857, p. 346 (part).

Characters.—Hairs of crown short, reflexed, but not elevated into a crest. Fur brown, washed with yellow; crown-spot dark brown, narrow, prolonged down the nose, and expanded back-

ward on to the nape of the neck; sides of face, throat, chest, and front part of shoulders, greyish-yellow.

Distribution.—Widely distributed in the great forests from Paraguay to the United States of Colombia.

Habits.—This Capuchin wanders about among the high forest trees in small companies of from ten to a dozen, the larger number being females. It is very timid, and keeps well out of sight, so that it is difficult to watch its habits. Rengger, in his "*Säugethiere von Paraguay*," had more than once an excellent opportunity of observing these interesting Monkeys, and has given a capital account of them. He specially mentions the great affection the mother has for her offspring. "The mother's love," he says, "shows itself by the great care with which every old one handles her young, by laying them on the breast, by watching them, by searching their fur, and by the attacks they make on any intruder." In January the female gives birth to a single young one, and keeps it at her breast for the first week; later on she carries it partly on her back, partly under her arm. When sleeping the Weeping Çai curls itself up, covering its face with its arms and tail.

The leader of a troop shares his feelings with the others by various motions, and by giving utterance to certain noises, which are taken up by the others. Their feelings are also exhibited by a kind of laughing and crying. Rengger kept some of these Monkeys for several years in captivity in their own country, and says that, when happy, they uttered a peculiar tittering sound; they express agreeable sensations by drawing back the corners of the mouth without uttering any sound; this he supposed to be laughing, but, as Mr. Darwin remarks, it would be more appropriately called a smile. When

crying, their eyes fill with tears, but never flow down the cheeks. When in pain or terror, the form of the mouth, as observed by Mr. Darwin at the Zoological Gardens in London, is quite different from that expressing pleasure or satisfaction; and high shrieks are uttered.

Specimens of this species have been kept in captivity in Europe for six and seven years.

XII. THE THICK-FURRED CAPUCHIN. *CEBUS VELLEROSUS*.

Cebus vellerosus, Is. Geoffr., Cat. Méth. Primates, p. 44 (1851, part.); Gray, Cat. Monkeys Brit. Mus., p. 49 (1870).

Cebus frontatus, Schl., Mus. Pays Bas, vii., p. 206 (1876, part.).

Characters.—Hairs of crown short; those on the side of the dark and narrow crown-spot, produced on the sides into two horns or crests. Fur thick and long, mingled with still longer glancing hairs; general colour blackish-brown; top of head, nape of neck, and whiskers black. (*Gray.*)

Distribution.—Brazil.

The following species has been described by Dr. Gray, but very little, if anything, is known of its habits or of the exact locality in which it lives.

XIII. THE PALE CAPUCHIN. *CEBUS FLAVESCENS*.

Cebus unicolor (nec Spix), Spix, Sim. et Vespert., Bras., p. 7 pl. 4 (1823, part.).

Cebus gracilis (nec Spix), Gray, List Mamm. Brit. Mus., p. 12 (1843).

Cebus flavescens, Gray, P. Z. S., 1865, p. 827; id. Cat. Monkeys Brit. Mus., p. 51 (1870).

Characters.—Fur nearly uniform pale yellowish-fulvous; the

cheeks, whiskers, and hair under the throat, greyish ; the crown, nape, and middle part of the back rather darker ; outside of the leg somewhat redder ; hair on top of head and nape rather elongate, directed backward, but not forming a crest.

Distribution.—Brazil.

XIV. THE GOLDEN-HANDED CAPUCHIN. *CEBUS CHRYSOPUS*.

Cebus chrysopes, F. Cuvier, Hist. Nat. Mamm., pl. 51 (part.).

Cebus chrysopus, Fischer, Syn. Mamm., p. 51 (1829); Is. Geoffr., Cat. Mèth. Primates, p. 47 (1851); Gray, Cat. Monkeys Brit. Mus., p. 51 (1870).

Cebus albifrons, Schl., Mus. Pays Bas, vii., p. 195 (1876, part.).

Characters.—Fur soft ; hairs of crown of head radiating from a centre, directed forward in front, forming a transverse crest on the middle of the crown. Face, throat, chest, and front of shoulders, pale greyish-brown ; back of head and eyebrows blackish. General colour of body pale sooty-brown, washed with golden ; outer side of limbs golden-buff.

Distribution.—United States of Colombia.

XV. THE BONNETTED CAPUCHIN. *CEBUS SUBCRISTATUS*.

Cebus subcristatus, Gray, P. Z. S., 1865, p. 827 ; id. Cat. Monkeys Brit. Mus., p. 52 (1870).

? *Cebus frontatus*, Schl., Mus. Pays Bas, vii., p. 206 (1876, part.).

Characters.—Hair of crown elongate, divided by a central line diverging to the eyebrows, forming an erect transverse crest behind them. Fur blackish-brown ; sides of face pale ashy ;

front of shoulders and of arms and outer side of legs, yellowish. Digits long and very slender.

Distribution.—Brazil.

XVI. THE CAPPED CAPUCHIN. *CEBUS CAPILLATUS*.

Cebus capillatus, Gray, P. Z. S., 1865, p. 827, fig. 1; id. Cat. Monkeys Brit. Mus., p. 52 (1870).

?*Cebus frontatus*, Schl., Mus. Pays Bas, viii, p. 206 (1876, part)

Characters.—Hairs of head elongate, diverging in all directions; fur long, brown, slightly washed with yellow, more markedly on the thighs; sides of forehead paler; sides of neck, outer sides of shoulders and arms, fulvous; crown and nape of neck, blackish.

Distribution.—Brazil.

XVII. AZARA'S CAPUCHIN. *CEBUS AZARÆ*.

"*Le Cay*," Azara, Essais Hist. Nat. Quadr. Prov. Paraguay, ii., p. 230 (1801).

Cebus azaræ, Rengger, Naturg. Säugeth., Paraguay, p. 26 (1830).

Characters.—Top of head black, with a band of the same colour passing in front of the ears, and terminating on the lower jaw; forehead, temples, and face, white; ear-tufts white; chin, throat, and upper side of feet white; upper side of tail, anterior part of the fore-feet and ankles, dusky; rest of body brown, lighter on the sides, becoming yellowish on the rump, the lower part of the body, and the under side of the tail. Length of the body, 17 inches; of the tail, 19 inches.

Female.—Paler in colour above than the male; the dark colour of the tail and of the limbs more extended.

Distribution.—Paraguay.

Habits.—This rare Capuchin lives, as Azara relates, in the forests of Paraguay, and is met with both in single couples and in small troops. They are very lively little animals, ever in motion, swinging themselves from tree to tree by means of their tails, the mothers of the company generally carrying their single young one on their back. When once tamed they become very affectionate; when angry they can give vent to excruciating screams. Their ordinary voice resembles that of someone laughing with all their might, and crying Hu! hu! hu!

Only once has a specimen of this Capuchin been an inmate of the Zoological Gardens in London.

XVIII. SCHLEGEL'S CAPUCHIN. *CEBUS FALLAX*.

Cebus fallax, Schl., Mus. Pays Bas, vii., p. 210 (1876).

Characters.—In colour closely resembling *C. fatuellus*, but the hair is longer all over, silky, and of a dusky hue, especially on the hinder part of the body. The lumbar vertebræ are four in number, and there are also fourteen pairs of ribs.

Distribution.—Unknown.

THE WOOLLY MONKEYS. GENUS *LAGOTHRIX*.

Lagothrix, Geoffr., Ann. Mus., xix., p. 106 (1812).

The animals grouped under the genus *Lagothrix* are readily distinguished by having a heavy body, and a rounded head, with the muzzle much flattened, and the nostrils nearly circular, but not approximated. More conspicuous than any other external character is the woolliness of their under-fur.

The name *Lagothrix* was given by Humboldt to the first specimen he found, because of the similarity of its fur to that

of the hare, and hence this name, from *λαγώς*, a hare, and *θρίξ*, *τρίχος*, hair, was adopted for the new genus, which was afterwards established by Geoffroy St. Hilaire.

The hair of the crown is short and directed backwards ; the tail is long and perfectly prehensile, being naked and sensitive for a considerable distance back from the tip. The limbs are moderately long, and the thumb and great-toe are well developed, the nails of the digits being compressed and pointed.

In regard to the skeleton, the skull of *Lagothrix*, as Dr. Slack points out, can be readily distinguished from that of the Capuchins by a broad, well-marked, articulation taking place between the pre-maxillary and the nasal bones at right angles to the suture between the latter, while in the Capuchins no true articulation takes place between these bones. The lower jaw is larger than in *Cebus*, approaching the size and form of *Myetes*. The incisor teeth are small and unequal, the upper inner incisor being the largest ; the canines are very large and grooved in front.

The Woolly Monkeys are slow in motion, gregarious, diurnal, and arboreal. The "Barrigudos," as they are called by the Portuguese colonists, live exclusively on fruits, and are larger and less active than the Capuchins. They are confined to the forests of the Ecuador district of the Upper Amazon Valley, and along the slopes of the Andes, north to Venezuela and south to Bolivia.

They are of a mild disposition, and, as Mr. Wallace remarks, they are the species "most frequently seen in confinement, and are great favourites, from their grave countenances, which resemble the human face more than those of any other Monkeys, their quiet manners, and the great affection and docility they exhibit,"

1. HUMBOLDT'S WOOLLY MONKEY. LAGOTHRIX LAGOTHRIX.

Simia lagotherica, Humb. and Bonpl., Obs. Zool., i., p. 322 (1811).

Lagothrix cana, Id. tom. cit. i., p. 354 (1811).

Lagothrix lagotricha, Id. tom. cit. p. 354.

Lagothrix humboldtii, Geoffr., Ann. Mus., xix., p. 107 (1812);

Scl., P. Z. S., 1863, p. 374, pl. xxxi.; Schl., Mus. Pays Bas, vii., p. 162 (1876, part.).

Lagothrix canus, Geoffr., Ann. Mus., xix., p. 107 (1812).

Gastrimargus olivaceus, Spix, Sim. et Vespert., Bras., p. 39, pl. 28 (1823).

Lagothrix tschudii, Pucher., Rev. et Mag. de Zool., 1857, p. 296.

Lagothrix geoffroyi, Pucher., t. c. p. 297.

Lagothrix cana, Schl., Mus. Pays Bas, vii., p. 162 (1876; part.).

Lagothrix olivaceus, Spix, ?; Bates, Nat. River Amazon, ii., p. 320 (1863).

(Plate XX.)

Characters.—Body large and heavy; face naked, black, and wrinkled; forehead low, the eyes projecting; a few scattered white hairs on lips. Hair of under surface hoary, and longer than that of the upper surface.

Adult Male.—General colour blackish, hoary-grey, the hairs being dark grey, tipped with black. Head, chest, hands, under surface of body, and tip of tail, black. Length of the body, from 19 or 20 inches to 27 inches in very large specimens; tail from 24 to 26 inches.

Young.—Hoary grey, darker on the belly and inner surface of the limbs; hands and top of head black.

Distribution.—This Monkey was discovered by Humboldt on the Guaviaré, a branch of the Orinoco river. It occurs in the



HUMBOLDT'S WOOLLY MONKEY.

Upper Magdalena Valley, Colombia, where it is known as the "Churuco" river. Its true habitat is the district south-west of the Rio Negro towards the Andes. It is unknown in the Lower Amazon Region.

Habits.—The "Caparro," as the Orinoco Indians named this species to Humboldt, or "Macaco barrigudo," as the Portuguese settlers call it, is entirely an arboreal animal, living exclusively on fruits, on which it is a most voracious feeder. The name of "big-bellied," which *barrigudo* means, is probably obtained from the effects of this habit. Its manners in captivity are grave, and its temper, according to Mr. Bates, is mild and confiding, like that of the Coaitas, or Spider-Monkeys. Owing to these traits, the Barrigudo is much sought after as a pet; but it is not hardy like the Coaitas, and seldom survives a passage down the river to Pará. Nevertheless, the Zoological Society has had a considerable number of these Monkeys in confinement during the past twenty years. Mr. Bates also states that it is much persecuted by the natives on account of the excellence of its flesh as food. "From information given me," he says, "by a collector of birds and mammals whom I employed, and who resided a long time among the Tacuna Indians, near Tabatinga, I calculated that one horde of this tribe, 200 in number, destroyed 1,200 of these Monkeys annually for food. The species is very numerous in the forests of the higher lands, but, owing to long persecution, it is now seldom seen in the neighbourhood of the larger villages."

II. THE BROWN LAGOTHRIX. LAGOTHRIX INFUMATUS.

Gastrimargus infumatus, Spix, Sim. et Vespert., Bras., p. 41, pl. 29 (1823).

Lagothrix poeppigii, Schinz, Synops. Mamm., i., p. 71 (1844);
Pucher., Rev. et Mag. de Zool., p. 299 (1857); Schl.,
Mus. Pays Bas, vii., p. 164 (1876).

Lagothrix geoffroyi, Schinz, Synops. Mamm., i., p. 72 (1844).

Lagothrix castelnaui, Is. Geoffr. et Deville, C.R., xxvii., p. 498
(1848); Casteln., Voy. Amér. Sud, Zool., p. 5, pl. 1.

Lagothrix infumatus, Gray, Cat. Monkeys Brit. Mus., p. 46
(1870); Scl., P. Z. S., 1871, p. 219 (Note).

Characters.—Large in size; face naked, black; general colour dark reddish-grey, the hairs being reddish-brown at the base, and tipped with grey or black; head, face and hind hands darker brown; chest, upper side of fore-arms, and under surface of body dark brown, or almost black; sides of body, base of the tail and perineal region brownish-red; hair of chest and under surface long and rather rigid.

Distribution.—The Brown Lagothrix, also called "Capparo" by Humboldt, is common in the forests of the low country over the whole of the Valley of the Peruvian Amazons. It has been recorded from the Valley of the Copataza river, and also from Macas, both in Cis-Andean Ecuador.

Habits.—These Monkeys go about in pairs, in troops of about twelve to fourteen, and frequent the great forest trees. They are often found in company with species of other genera, such as the Howlers. They are exclusively fruit-eaters, and are in great request as food; large numbers, consequently, are destroyed annually for this purpose.

THE WOOLLY SPIDER-MONKEYS. GENUS BRACHYTELES

Brachyteles, Spix, Sim. et Vespert. Brazil, p. 36 (1823).

Eriodes, Is. Geoffr., Dict. Class., xv., p. 143 (1829).

The members of this genus resemble in general form the

Spider-Monkeys, to be presently described, and they present also many resemblances to the foregoing species of the Woolly Monkeys. Their limbs are long and slender, and their body heavy, and covered with a woolly under-fur. Their head is rounder than in the Capuchins. The face is flat, and the facial angle large. The nose has the partition between the nostrils narrower than in the other species of the family, and the nostrils are themselves more approximated, circular in form, and directed more downward than outward, thus showing some approach to the position of the nostrils in the Old World Apes. Their fore-limbs are long and slender, and the thumb is often entirely absent (as in the Guerezas of Africa), or there may be a very rudimentary digit, which sometimes ends in a small nail. The nails of the digits are, as in *Lagothrix*, very compressed and sharp. The tail is longer than the body, naked on the under side, and sensitive at its termination, and therefore prehensile.

The skull is globular, and the pre-maxillary bones articulate with the nasal bones by a broad surface. The incisor teeth are equal in size; the canines are small, and of the same length as the incisors, and the molars, which are vertically higher than the canines, are thick and quadrangular. The lower jaw is dilated behind, somewhat less than in *Lagothrix*.

The Woolly Spider-Monkeys are very rare, and little is known of their habits. They are confined to the south-eastern coast forests of Brazil, that region to the south of Cape San Roque, whence, as far as Rio Grande do Sul, ever-verdant forests, as Mr. Wallace has described, clothe all the valleys and hills of the lowland region, stretching as far west as the higher mountain ranges parallel to the coast, and even up the valleys of the larger rivers a long way into the interior of the country.

THE BROWN WOOLLY SPIDER-MONKEY. BRACHYTELES
ARACHNOIDES.

Ateles arachnoides, Geoffr., Ann. Mus., vii., p. 271 (1806);
xiii., p. 90, pl. 9 (1809); xix., p. 106 (1812); Schl., Mus.
Pays Bas, vii., p. 184 (1876, part.).

Ateles hypoxanthus, Desm., Mamm., p. 75 (1820); Neuwied,
apud Kuhl, Beitr. Zool., p. 25 (1820); Schl., t. c.
p. 185 (1876, part.).

Brachyteles macrotarsus, Spix, Sim. et Vespert., Bras., p. 36,
pl. 17 (1823).

Eriodes hemidactylus and *E. tuberifer*, Geoffr., Mém. Mus.,
xvii., pp. 161, 163 (1828).

Eriodes arachnoides, Geoffr., Mém. Mus., t. c. p. 160 (1828)

Brachyteles arachnoides, Gray, Cat. Monkeys Brit. Mus., p. 45
(1870).

Characters.—**Male.**—Size small; face nude, flesh-coloured; general colour of body yellowish-brown, darker on the back of the head, with a few long black hairs on the forehead; hairs of head short and directed backward; buttocks, vent, base of tail and perineal region dark ferruginous-brown; the thumb wanting or rudimentary. Length of body, 22 inches; tail, 26 inches.

Female.—Ashy-brown, instead of yellowish-brown, in appearance.

Young.—In some young specimens the general colour is dark brown, with the sides of the face white.

Dr. Slack observes, in the "Proceedings of the Academy of Natural Sciences of Philadelphia" for 1862, in reference to this species: "I had long suspected that the three species of this genus described by Isidore Geoffroy St. Hilaire, were in reality one and the same; no specific characters are manifest in their coloration, or skulls, the supposed differences being

based upon the development of the anterior thumbs, this member being absent in *B. arachnoides*, replaced by a small nailless tubercle in *B. tuberifer*, and surmounted by a nail in *B. hemidactylus*. In the "Magazin" of Messrs. Verreaux, in Paris, I found specimens having upon one hand the tubercle, and upon the other the nailed thumb, others with the tubercle on one hand, but absent upon the other. St. Hilaire himself, in his "Catalogue of the Primates," expresses a doubt as to whether *B. arachnoides* and *B. hemidactylus* are really distinct. In September and October, 1860, I was unable to find *B. hemidactylus* in the Paris Museum, all the *Brachyteles* being labelled *Eriodes arachnoides*."

Distribution.—Confined to the wooded region of the south-east of Brazil.

Habits.—Arboreal, diurnal, and (it is supposed) gregarious, frequenting the high forest trees, and subsisting on fruits.

THE SPIDER-MONKEYS. GENUS ATELES.

Ateles, Geoffr., Ann. Mus., vii., p. 262 (1806).

This is the fourth remaining genus of the *Cebince*, the last Sub-family of the *Cebidæ*. With the description of the Spider-Monkeys, therefore, we shall have passed in review all the species of the New World Platyrrhine section of the *Anthropoidea*. The species of this group derive their trivial name from their long and slender limbs; the name applied to them, however, in their native forests by the Indians of Brazil is "Coaita." They are characterised by their light and slender body, which is narrower across the loins than across the chest. The head is rounded, the forehead salient, and the muzzle somewhat projecting. Both pairs of limbs are much elongated, the hind-

limbs being shorter, however, than the fore-, and the thumb of the fore-limb is sometimes very rudimentary, being only a nail-less tubercle—or, in the majority of the species, entirely absent, rendering the hand a much less perfect organ for holding or picking up small objects, such as fruits, &c. ; but its absence probably does not affect, if it does not even benefit, the hand as an organ for climbing and catching hold again after a long leap. The nails and other digits of both limbs are compressed, but much less so than in *Brachyteles* and *Lagothrix*. The tail is very long, generally exceeding the length of the body and head, and is nude on the under side, and very sensitive towards its termination. As a prehensile organ it has reached the summit of strength and perfection. "It even serves as a fifth hand, as detached objects, otherwise out of reach, can be grasped by it, and brought towards the hand or mouth." (*Mivart*.) The body is covered with long, rather coarse, generally black, hair, and has no woolly under-fur, as in *Lagothrix* and *Brachyteles*.

With regard to the skeleton of *Ateles*, the lumbar region of the vertebral column is short, and the dorsal segment attains a greater relative length than in any other Ape, being over nine-twentieths of the total length of the spine, without the tail. (*Mivart*.) The dorsal and lumbar vertebræ together number eighteen. In the tail there are twenty-three vertebræ, flattened on the under side, and exceptionally provided with bony processes, serving as points for the attachment of muscles for rendering it as efficient a prehensile organ as possible. The length of the whole arm and hand in *Ateles*, in proportion to that of the spine, is 174 to 100 ; but without the hand it is shorter than the spine, the hand itself being only slightly shorter than the latter. The proportion of the hind-limb to the spine is somewhat less, being 169 to 100. The thumb is reduced to a single metacarpal bone, to

which, usually, a single minute nodular phalanx [finger-bone] is articulated, and is completely hidden beneath the integument. Although thus rudimentary and functionless, all its characteristic muscles, except one (the long-flexor) are present. (*Huxley*.) The upper incisors are unequal, the interior being the larger. There is a space (diastema) between the incisor and the canine teeth (as in all *Anthropoidea*, except Man); the canines are large and conical; the upper molars large, and their crowns four-cusped, with transverse ridges between the outer and inner front cusps and the outer and inner hind cusps, and also an oblique ridge crossing from the outer front cusp to the inner hind one. In the larynx of *Ateles* there is a single median air-sac opening from the back of the windpipe, but there is no such extension of the resonating apparatus as is seen in the Howlers (*Alouatta*). In its brain *Ateles* exhibits in some respects a higher type than in even the Old World Apes.

In regard to this group of Monkeys, the late Mr. H. W. Bates made the following interesting observations:—"In the Coaitas the tail reaches its highest perfection as a prehensile organ; and on this account it would perhaps be correct to consider the Coaitas as the extreme development of the American type of Apes. As far as we know from living and fossil species, the New World has progressed no further than the Coaita towards the production of a higher form of the Quadrumanous order. The tendency of Nature here has been, to all appearance, simply to perfect these organs, which adapt the species more and more completely to a purely arboreal life; and no nearer approach has been made towards the more advanced forms of Anthropoid Apes, which are the products of the Old World solely. The tail of the Coaita is endowed with

a wonderful degree of flexibility. It is always in motion, coiling and uncoiling like the trunk of an Elephant, and grasping whatever comes within reach. . . . The flesh of the Coaitas is much esteemed by the natives in this part of the country [Obydos, on the Amazon]. . . . One day I went on a Coaita hunt. When in the deepest part of a ravine we heard a rustling sound in the trees overhead, and Manoel [the guide] pointed out a Coaita to me. There was something human-like in its appearance [which is very characteristic of them], as the lean, dark, shaggy creature moved deliberately amongst the branches at a great height. I fired, but unfortunately only wounded it in the belly. It fell with a crash headlong about twenty or thirty feet, and then caught a bough with its tail, which grasped it instantaneously, and then the animal remained suspended in mid-air. Before I could re-load it recovered itself, and mounted nimbly to the topmost branches out of the reach of a fowling-piece, where we could perceive the poor thing, apparently probing the wound with its fingers. Coaitas are more frequently kept in a tame state than any other kind of Monkey. The Indians are very fond of them as pets, and the women often suckle them when young at their breasts.* They become attached to their masters, and will sometimes follow them on the ground to considerable distances. . . . The disposition of the Coaita is mild in the extreme ; it has none of the painful, restless vivacity of its kindred, the *Cebi*, and no trace of the surly, untameable temper of its still nearer relatives, the *Myccetes*, or Howling-Monkeys. It is, however, an arrant thief, and shows considerable cunning

* This curious custom, of women suckling animals, was also observed by the present writer in New Guinea, where the native women suckle puppies and young pigs.

in pilfering small articles of clothing, which it conceals in its sleeping place."

The Coaitas are like the rest of the *Cebidæ*, essentially quadrupedal, but they occasionally assume the erect posture. They are purely arboreal in habit, living in small companies in the very high trees of the forest.

Their geographical distribution is very wide. They extend over the whole area of the *Cebidæ*, *i.e.*, over two of the sub-regions, the Brazilian and Mexican, of the Neotropical Region.

I. THE VARIEGATED SPIDER-MONKEY. *ATELES VARIEGATUS*.

Ateles marginatus (nec Geoffr.), Humb. Obs. Zool., pp. 340, 354 (1811).

Ateles variegatus, Wagner in Schreb., Säugeth., i., p. 313 (1840); id. Abhandl. Akad. Münch., v., p. 420 (1847); Sclater, P. Z. S., 1870, p. 668; 1871, pp. 39, 225; Gray, Ann. Nat. Hist. (4), vi. (1870), p. 472.

Sapajou geoffroyi (nec Kuhl), Slack, Proc. Acad. Nat. Sci. Philad., 1862, p. 511 [= ♂].

Ateles bartletti, Gray, P. Z. S., 1867, p. 992, pl. xlvii.

Ateles melanochir, var. Gray, Cat. Monkeys Brit. Mus., p. 43 (1870, in part).

Ateles churva, Schl., Mus. Pays Bas, vii., p. 175 (1876).

(Plate XXI.)

Characters.—Male.—Fur of body abundant, long, and soft; hair of back and top of head long and directed forwards, and projecting over the forehead; beneath and behind the cheeks a band of longish hairs, directed forwards. Top of head, back, front aspect of the entire arms, and of the legs to the knees, hands, feet, and upper side of tail glossy blue-black; a band

across the forehead rufous-yellow; the hairs directed upwardly, bordered by a narrower streak of deep black over the eyes; the under side of the fore-limbs, the posterior aspect of the thighs, and the entire leg, the buttocks, and the whole of the under side of the tail as far as the nude portion (which is black), rich orange-yellow; under surface of body paler. Face naked, black, and bordered by a broad white patch of whiskers, reaching from the temple nearly to the angle of the mouth. The black part of the limbs and legs near to the yellow colour, varied with more or fewer yellow hairs.

Female and Young Male.—Similar to the adult male, but less in size, and the coloration paler than in the adult male. Elbows and feet black; under side of the body greyish-yellow. The white stripe on the sides of the face is wanting in the young female.

Distribution.—Chyavetas, Nauta, and Elvira in the Peruvian Amazons; Upper Rio Negro, Serra de Cocoi; Upper Cauca river, a southern confluent of the Orinoco; Venezuela. "This species is found on both sides of the Peruvian Amazon (or Marañon), on both shores of the Huallaga, and in the interior forest near the town of Chamicuros. I was told by some of the oldest Indians that these animals are common in the dense forest on the hills near the latter town, their range extending between the Huallaga river and Ucayali river to the head-waters of the Huallaga, between the towns of Lamas and Sarayaçu. . . . Then again on the Rio Tigri . . . and over the head-waters of the Rio Napo, Rio Japurá and Rio Negro, where Natterer first discovered it." (*Bartlett.*)

Habits.—This Monkey, the "Chuva de Baracamorros" of



THE VARIEGATED SPIDER-MONKEY.

Humboldt, which is the most beautifully coloured of its group, is said to go about in small parties, passing through the forest at a rapid rate, feeding on different kinds of berries.

II. GEOFFROY'S SPIDER-MONKEY. *ATELES GEOFFROYI*.

Ateles geoffroyi, Kuhl, Beitr. Zool., p. 26 (1820); Schl., Mus. Pays Bas, vii., p. 181 (1876); Alston, in Godman and Salvin, Biol. Centr. Amer. Mamm., p. 8 (1879).

Ateles melanochir, Desmar., Mamm., p. 76 (1820); Gray, Cat. Monkeys Brit. Mus., p. 43 (1870); Sclater, P. Z. S., 1871, p. 226, pl. xv., 1875, p. 419, pls. xlviii. and xlix.

Eriodes frontatus, Gray, Ann. Nat. Hist., x., p. 256 (1842); id. Voy. H.M.S. "Sulphur," Zool., p. 9, pl. i.; Scl., P. Z. S., 1882, p. 186; Von Frantzius, Arch. f. Naturg., xxxv., 1869, pp. 257, 258.

Sapajou geoffroyi, Slack, Pr. Ac. Sc. Philad., 1862, p. 511 (= female).

Ateles variegatus (nec Wagn.), Von Frantzius, Arch. f. Naturg., xxxv., 1869, p. 257.

Ateles hybridus, *A. ornatus* et *A. albifrons*, Gray, Cat. Monkeys Brit. Mus., pp. 43 and 44 (1870).

Characters.—Body light greyish-drab all over; hands, elbows, feet, knees, and the upper side of the extremity of the tail, black; face black, with the exception of the lips and a ring round the eyes, broad above and narrow below, flesh-coloured. Hair of forehead reflexed, meeting that of the crown above the eyes, forming a triangular patch of erect black hairs. Top of the head and upper part of the tail buff. Length of body, 17 inches; of tail, 21 inches. Thumb entirely wanting.

This species is remarkably variable. The description given above belongs to the form described as *A. melanochir* by Des-

marest from the same specimen in Paris, which Kuhl described under the name of *A. geoffroyi*. Every gradation is to be met with between this and the form described by Dr. Gray as *A. ornatus*, in which the face is entirely black, the whiskers pale reddish-yellow, the patch of erect black hair on the forehead yellowish at its base; the top of the head, sides, lower back, rump, upper part of the arms, outer, inner and posterior portion of the thighs and legs, and under side of the base of the tail, brownish-red; nape, shoulders and remainder of the tail reddish-brown, washed with black; lower part of arms, fore-arms, hands, feet, and anterior aspect of thighs and legs, black.

In some specimens the grey, or reddish-black colour, merges on the under surface, into yellowish-cream, or rufous, and the black wash is more or less distributed.

Mr. Alston, in speaking of this species, remarks that the best character by which the darker (*A. ornatus*) forms may be distinguished from our next species (*A. rufiventris*) is the want of a distinct line of demarcation between the colours of the upper and lower parts, the tint of the flanks, whatever it may be, passing almost insensibly into that of the breast and belly in all the varieties.

Distribution.—The variation in colour described above is not due to local causes, every variety occurring between the lightest and darkest, in all the regions which this species is known to inhabit. The localities from which it has been recorded are on both the Atlantic and Pacific coasts of Nicaragua; Costa Rica, where it occurs in large numbers from the coast forests up to nearly 7,000 feet on the mountains; Panama, and the U.S. of Colombia.

Habits.—Geoffroy's Spider-Monkey is gregarious and arboreal,

frequenting the highest trees of the forest, both in the low country and at high elevations, and living on fruits and insects, but chiefly on the former. Mr. Belt relates that on the banks of the Antigua he saw a valuable tree, the "Nispera" (*Achras sapota*), growing on the dryer ridges. "It bears a round fruit about the size of an apple, hard and heavy when green, and at this time it is much frequented by the large yellowish-brown Spider-Monkey (*Ateles*), which roams over the tops of the trees in bands of from ten to twenty. Sometimes they lay quite quiet until I was passing underneath, when, shaking a branch of the Nispera tree, they would send down a shower of the hard round fruit; but fortunately I was never struck by them. As soon as I looked up they would commence yelping and barking and putting on the most threatening gestures, breaking off pieces of branches and letting them fall, and shaking off more fruit, but never throwing anything, simply letting it fall.* Often when on lower trees, they would hang from the branches, two or three together, holding on to each other and to the branch with their fore-feet and long tail, whilst their hind-feet hung down, all the time making threatening gestures and cries. Sometimes a female would be seen carrying a young one on its back, to which it clung with legs and tail, the mother making its way along the branches, and leaping from tree to tree, apparently but little encumbered by its baby. A large black and white Eagle is said to prey upon them, but I never saw one, although I was constantly falling in with troops of the Monkeys. Don Francisco Velasquez, one of our officers, told me that one day he heard a Monkey crying out in the forest for more than two hours, and at last, going to see what was

* Humboldt and Stedman both state that these Monkeys *throw* pieces of branches towards them.

the matter, he saw a Monkey on a branch and an Eagle beside it trying to frighten it to turn its back, when it would have seized it. The Monkey, however, kept its face to its foe. . . . Velasquez fired at the Eagle, and frightened it away. I think it likely, from what I have seen of the habits of this Monkey, that they defend themselves from the Eagle's attack by keeping two or three together, thus assisting each other, and that it is only when the bird finds one separated from its companions that it dares to attack it."

Mr. Osbert Salvin met with several of these Monkeys near the town of San Juan del Sur, in Nicaragua. He was walking up the course of a half-dry stream when he came upon a troop of Monkeys which had come to a pool to drink, and were climbing about the low trees on the bank of the watercourse. Most of the troop consisted of *Cebus hypoleucus*, but with them were several *Ateles* of the present species, of one of which Mr. Salvin wrote a description as it sat jabbering at him and throwing down sticks from a branch above his head. Mr. Salvin also told Mr. Alston that it was not unusual to see Monkeys kept in confinement in the court-yards of the Spanish houses in Guatemala. Amongst them were occasionally to be seen specimens of Geoffroy's Spider-Monkey; but he always found that they had been brought from Nicaragua or Costa Rica, the species not extending into Guatemala.

III. THE RED-BELLIED SPIDER-MONKEY. ATELES RUFIVENTRIS.

Ateles vellerosus (?) (nec Gray), Scl., P. Z. S., 1871, p. 478.

Ateles rufiventris, Scl., P. Z. S., 1872, p. 688, pl. lvii.; Schlegel, Mus. Pays Bas, vii., p. 182 (1876).

Characters.—Fur rough, upstanding less on the tail than on

the body, that on the forehead erect and directed backwards, that on the top of the head long, projecting forward. Face and muzzle, except a black line from the side of the nose and inner corners of the eyes to the cheeks, flesh-coloured. General colour uniform black, but the whole under surface deep bright rufous, this colour extending but slightly on to the inner surface of the limbs. Thumbs entirely wanting.

Differs from *A. geoffroyi* by its flesh-coloured face and by the two colours of the upper and under sides being clearly defined. Length of body, 12 inches; of tail, 15½ inches.

Distribution.—This species was first discovered on the Atrato river, in Northern Colombia, and has since been found in Panama.

Habits.—The Red-bellied Spider-Monkey is very rare, only one or two specimens having yet been obtained. Nothing is, therefore, known of its habits.

IV. THE RED-FACED SPIDER-MONKEY. *ATELES PANISCUS*.

Simia paniscus, Linn., Syst. Nat., i., p. 27 (1766).

Ateles pentadactylus, Geoff., Ann. Mus., vii., p. 269 (1806);

Schl., Mus. Pays Bas, vii., p. 172 (1876, in part).

Ateles paniscus, Geoff., Ann. Mus., vii., p. 270 (1806); Gray,

Cat. Monkeys Brit. Mus., p. 42 (1870); Schl., Mus. Pays

Bas, vii., p. 169 (1876, part.).

Le coaita, F. Cuv. et Geoffr., Nat. Hist. Mamm., liv., v. (Avril, 1819).

Sapajou paniscus, Slack, Proc. Acad. Nat. Sci. Philad., p. 509 (1862).

Characters.—Very similar to *A. ater* in its coarse and entirely black fur, but differing in the naked and flesh-coloured

face. Hairs of forehead long and projecting anteriorly ; tail one-quarter longer than the body ; hands generally entirely lacking the thumbs, though sometimes a rudimentary thumb is present, and that occasionally on one hand only. Naked portion of tail covered with sensory papillæ, rendering it more sensitive, so it is said, than the hand. Length of body, 24 inches ; tail, 30 inches. The skull in some specimens of the thumbed variety is compressed laterally, and shows a sagittal crest along the top.

Distribution.—This species is spread over Guiana, the forests of the Ucayali and Huallaga rivers in eastern Peru, and the northern part of Brazil, where it is known as the “Coaita,” taking the place of the more northern *Ateles ater*. “It occurs,” says Mr. Bates, “throughout the lowlands of the Lower and Upper Amazons, but does not range to the south beyond the limits of the river plains.” In the higher part of the Rio Negro it comes down to the north bank, but does not cross to the south bank of the river.

Habits.—This species is the best known of all the Spider-Monkeys. It is captured in large numbers, when young, by the natives of Guiana, and as they bear captivity well, many of them have been brought to Europe. They live in larger troops than do some of the other members of its genus ; indeed, these companies are said to number as many as a hundred. They are very easily tamed, and become very affectionate. They live chiefly on fruits, principally on a species of palm-nut. Dampier, however, says, apparently of this species of *Ateles* : “The Monkeys come down by the Sea-side [at low water] and catch them [the Periwinkles and Muscles] ; digging them out of their Shells with their Claws.” Large numbers of this species

are also annually killed for food, their flesh being held in high esteem by the natives.

V. THE WHITE-WHISKERED SPIDER-MONKEY. *ATELES*
MARGINATUS.

Ateles marginatus (nec Humb.), Geoffr., Ann. Mus., xiii., p. 92, pl. 10 (1809); Kuhl, Beitr. Zool., p. 24 (1820); Gray, Cat. Monkeys Brit. Mus., p. 43 (1870); Schl., Mus. Pays Bas, vii., p. 174 (1876).

Coaita à front blanc, femelle, Fr. Cuv., Hist. Nat. Mamm., livr. lxii. (Avril, 1830).

Ateles frontalis, Bennett, P. Z. S., 1831, p. 38.

Characters.—Similar in size and coloration to *A. paniscus*. Body lean; hair moderately long and coarse. Face naked, black, except the skin round the eyes, which is flesh-coloured; general colour black; under surface of body and inner sides of limbs, ashy-grey. It differs from *A. paniscus* by having the forehead, crown of head, a spot on each side of the nose, and the whiskers, white.

A specimen in the British Museum has four pre-molars in each upper jaw, instead of the normal three of the *Cebidæ*.

Distribution.—This species was discovered by Humboldt on the banks of the Santiago river. Mr. Bates says "it is never met with in the alluvial plains of the Amazons," nor, he believes, on the northern side of the great river-valley, except towards its head-waters near the Andes.

Habits.—According to Von Humboldt, this Spider-Monkey—known as the "White-Whiskered Coaita"—is very fierce and libidinous. Mr. Bates encountered this large and handsome species on the Cupari river, a tributary of the Tapajos, one

of the large southern affluents of the Amazon. Here he could get scarcely anything but fish to eat, and, as this diet did not agree with him, he was obliged to have recourse to the Coaita flesh. "I thought," he says, "the meat the best flavoured I have ever tasted. It resembled beef, but had a richer and sweeter taste . . . We smoke-dried the joints instead of salting them ; placing them for several hours on a framework of sticks arranged over a fire. Nothing but the hardest necessity could have driven me so near to cannibalism as this, but we had the greatest difficulty in obtaining here a sufficient supply of animal food." Von Humboldt has also referred to the cooking of these Monkeys by the natives of the Upper Orinoko. "The manner of roasting these anthropomorphous animals," he writes, "contributes singularly to render their appearance disagreeable in the eyes of civilised Man. A little grating or lattice of very hard wood is formed, and raised one foot from the ground. The Monkey is skinned and bent into a sitting posture ; the head generally resting on the arms, which are meagre and long ; but sometimes these are crossed behind the back. When it is tied on the grating a very clear fire is kindled below On seeing the natives devour an arm or leg of a roasted Monkey, it is difficult not to believe that this habit of eating animals which so much resemble Man in their physical organisation, has in a certain degree contributed to diminish the horror of anthropophagy among savages. Roasted Monkeys, particularly those that have a very round head, display a hideous resemblance to a child ; the Europeans, therefore, who are obliged to feed on Quadrumanes, prefer separating the head and the hands, and serve up only the rest of the animal at their tables. The flesh of Monkeys is so lean and dry that Mr. Bonpland has pre-

served in his collections at Paris an arm and hand, which had been boiled over the fire at Esmeraldas ; and no smell arises from them after a great number of years."

VI. THE BLACK-FACED SPIDER-MONKEY. ATELES ATER.

Ateles ater (Le Caijou), F. Cuvier, Mamm., i., pl. xxxix. (1823) ; Sclater, P. Z. S., 1872, p. 5 ; Gray, Cat. Monkeys Brit. Mus., p. 42 (1870) ; Schl., Mus. Pays Bas, vii., p. 170 (1876).

Sapajou ater, Slack, Proc. Ac. Nat. Sci. Philad., 1862, p. 510

Characters.—Entirely black ; fur silky, and longer on the head and tail than on the body ; fur on top of head directed from behind forwards, falling over the forehead, meeting the backwardly directed hairs of the forehead and forming a tuft. Face black, the upper part naked ; chin with stiff black hairs mixed with a few white ones. Ears oval and human-like in form, the upper part movable at will. Thumbs entirely wanting. Length of body, 19 inches ; tail, 26 inches.

Distinguished from *A. paniscus*, which it closely resembles, by the black colour of its face, and the direction of the hairs on the forehead.

Young.—Lighter in colour than the adults ; sometimes brown on the back and the outer side of the limbs.

Distribution.—The Black-Faced Spider-Monkey ranges from Panama, through the United States of Colombia to Eastern Peru.

Habits.—Entirely arboreal, living in large troops, and feeding on fruits.

VII. THE GRIZZLED SPIDER-MONKEY. ATELES GRISESCENS.

Ateles griseus, Scl. MSS. ; Gray, P. Z. S., 1865, p. 732 ; id. Cat. Monkeys Brit. Mus., p. 42 (1870) ; Scl., P. Z. S., 1871, p. 223 ; Schl., Mus. Pays Bas, vii., p. 168 (1876).

Characters.—Hair of forehead elongate. Fur in general moderately long, black, with greyish-white hairs intermingled, giving it a grizzled appearance ; under side of tail grey. Similar to *A. ater* and *A. paniscus*, but distinguished by the intermixture of grey hairs, and by the colour of the under side of the tail. Thumbs absent.

Young Male.—Rather lighter in colour, especially on the under side of body ; tail black above, grey beneath. Length of body, 14 inches ; tail, 16 inches.

Distribution.—The habitat of this species is not certainly known. Dr. Sclater considers it probable that it will turn up in some part of the Central American or the Colombian coast.

VIII. THE BROWN-HEADED SPIDER-MONKEY. ATELES FUSCICEPS.

Ateles fusciceps, Fraser MSS. ; Gray, P. Z. S., 1865, p. 733 ; Sclater, P. Z. S., 1872, p. 663, pl. lv. ; Gray, Cat. Monkeys Brit. Mus., p. 42 (1870) ; Schl., Mus. Pays Bas, vii., p. 173 (1876).

Characters.—Fur thick. Hairs long, shining, crisp, deep black above, the hairs of the back with brownish tips ; the under side of the body and inside of the limbs black ; crown of head deep coffee-brown. Length of body about 20 inches ; of the tail, 26 inches, according to the dimensions taken from the skin of a young animal by Dr. Sclater. Thumbs entirely wanting.

Distribution.—In 1860, when Mr. L. Fraser returned from Ecuador, he spoke of a large Monkey he had seen, but had not obtained, in the valleys of Western Ecuador. It remained unknown until it was shot, and brought to England by Mr. Buckley some ten years later. It was the only Monkey, he says, except a *Myctes*, which he saw in Trans-Andean Ecuador.

Habits.—These, doubtless, do not differ from those of other Spider-Monkeys.

IX. THE HOODED SPIDER-MONKEY. ATELES CUCULLATUS.

Ateles cucullatus, Gray, P. Z. S., 1865, p. 733; id. Cat. Monkeys Brit. Mus., p. 42 (1870); Murie, P. Z. S., 1865, p. 739; Schl., Mus. Pays Bas, vii., p. 169 (1876).

Characters.—Hairs of body long, but thin on the head, body, limbs and tail; hair of crown very long and projecting over the face and the sides of head, forming what has been called a “hood.” Face nude, flesh-coloured; cheeks and lower jaw nearly nude also, but the skin of a blackish hue. Hair on back black, intermingled with numerous others which are yellowish-grey in colour; crown and back of head, hands, and feet black—the hairs black throughout. Nude part of tail flesh-coloured. The hands have a rudiment of a thumb in the shape of a small tubercle. Length of body, 14½ inches; of tail, 27½ inches.

Distribution.—The Hooded Spider-Monkey is very rare, and very different from any other member of its group in regard to the hair of its head. Its native country is still a matter of uncertainty. Dr. Sclater, however, remarks in the “Proceedings of the Zoological Society” for 1881: “I have some reason to suppose

it may be from the northern coast of Colombia, as I am told that a black Spider-Monkey, with long hair over its head, is occasionally brought for sale into Cartagena."

X. THE LONG-HAIRED SPIDER-MONKEY. *ATELES VELLEROSUS*.

Ateles belzebuth, Geoffr., Ann. Mus., vii., p. 27, pl. xvi. (1806);

Gray, Cat. Monkeys Brit. Mus., p. 44 (1870); Schl., Mus.

Pays Bas, vii., p. 178 (1876).

Le marimonda, Humb. Obs. Zool., p. 325 (1811).

Ateles frontatus (nec Gray), Sclater, Nat. Hist. Rev., 1861, p. 509.

Ateles vellerosus, Gray, P. Z. S., 1865, p. 733; Reinh., P. Z. S., 1872, p. 797; Sclater, P. Z. S., 1873, pp. 5, 798, pl. ii.; Alston, in Godman and Salvin, Biol. Centr. Amer. Mamm., p. 10 (1879).

Ateles fuliginosus (nec Kuhl), Schl., Mus. Pays Bas, vii., p. 179 (1876).

Ateles pan, Schl., t. c. p. 180 (1876).

Characters.—Closely allied to *Ateles geoffroyi*. Hair abundant, long, soft, and flaccid. Face flesh-coloured, except for a black bar from the corner of the eye to the cheek; forehead black, its hair short, reflexed, and uniting, so as to form an erect, crest-like ridge, with the fur on the top of the head, which is directed forward. General colour above black to reddish-brown; the head, back, outer side of the entire fore-limb and of the lower part of the hind-limb, hands, and feet, and upper surface of tail deep black; sides of body, loins, and thighs yellowish-brown or dull black washed with rufous; whiskers, throat, whole of under surface of body, inside of fore- and hind-limbs, and under surface of tail (this sometimes black) yellowish-cream colour, but very variable, sharply defined from

the dark colour of the upper parts. Thumb entirely wanting. Eyes dark yellowish-grey. May be distinguished from the dark form of Geoffroy's Spider-Monkey by the sharp definition of the colours of the upper and under sides of the body.

Distribution.—This species, also spoken of as the Mexican Spider-Monkey, is known to occur right across Guatemala ; it is by no means uncommon, Mr. Salvin says, in the forest country on the northern part of Vera Paz, and he also saw a troop at the summit of the ridge of mountains which connects the Volcan de Fuego with the main Cordillera, at about 8,000 feet above the sea.

The late Prof. Liebmann, the Danish botanist, obtained a specimen, according to Prof. Reinhardt, "in the neighbourhood of the small place Mirador, situated not far from the volcano of Orizaba, in the State of Vera Cruz. . . . He met with it also in the eastern parts of the State of Oaxaca. . . . But at the same time he expressly states that he never met with this *Ateles*, nor, indeed, with any other Monkey, on the Pacific slope of the Great Cordillera in Oaxaca, and that, as far as he could learn, Monkeys are to be found on the western coast only south of Tehuantepec." This species is the only Spider-Monkey certainly known to range as far north as Mexico. According to M. Sallé, the most northern locality for Monkeys with which he was acquainted, was in the State of San-Louis Potosi, about 23° N. latitude, on the upper part of the basin of the Tampico river. (*Alston.*)

Habits.—The Mexican Spider-Monkey is, like the foregoing members of the genus, arboreal, consorting together in small troops, and feeding on fruits. Prof. Liebmann observed it in small troops in the deep barrancas, up to an elevation of 2,000

feet above the sea, on the Orizaba volcano, and in the forests of Oaxaca, to 4,000 feet. Mr. Salvin, on the volcano of Atitlan, in Guatemala, at a height of between 5,000 and 6,000 feet, met several troops of this species on the tops of the higher trees of the forest. These parties of Monkeys were usually about twenty in number and of all ages. On approaching them they did not evince any alarm, but kept uttering a constant querulous sort of bark, and moved from time to time so as to get a better view of the intruder. A few days afterwards, during an excursion to the same volcano, when the summit, 11,800 feet above the sea, was reached, numerous troops of *Ateles* were seen in the forest, from an elevation of 7,000 feet to as low as 2,500 feet on the outskirts of the coffee plantations of San Agustin.

Now that we have passed in review the whole of the Anthropoid species inhabiting the New World, a short account of the regions to which they are confined will be of some interest. The most northern limit of Monkeys is, as mentioned above, the State of San-Louis Potosi, about the latitude of 23° North. Their most southern limit attains to nearly 25° of South latitude. They are now confined to the Mexican and Brazilian sub-regions of what has been defined as the Neotropical Region, by Dr. A. R. Wallace, in his great work, "The Geographical Distribution of Animals." The Mexican sub-region belongs to the Neotropical Region, one of those six great areas into which the globe has been divided off by Dr. Sclater on the basis of the geographical distribution of the animals that now inhabit it—the final product of the slowly-changing features of the earth's surface, and of the form, structure, and habits of its animal and vegetable life.

The Mexican sub-region forms the northern part of the Re-

gion, and, to condense Mr. Wallace's account of it, it is of comparatively small extent ; but the whole of its area is mountainous, being, in fact, a continuation of the great range of the Rocky Mountains. It varies in elevation above the sea from 6,000 to 18,000 feet. "With the exception of the elevated plateaus of Mexico and Guatemala, and the extremity of the peninsula of Yucatan, the whole of Central America is clothed with forests ; and as its surface is much broken up into hill and valley, and the volcanic soil of a large portion of it is very fertile, it is altogether well adapted to support a varied fauna, as it does a most luxuriant vegetation." In this region only species of Spider-Monkeys (*Ateles*), of Howlers (*Alouatta*), of Capuchins (*Cebus*), of Night-Monkeys (*Nyctipithecus*), and of Squirrel-Monkeys (*Chrysotrrix*) are found. The Spider-Monkeys and the Howlers alone extend so far North as Mexico, and the Night-Monkeys reach to Nicaragua, while the Squirrel-Monkeys and Capuchins have penetrated no further than to Costa Rica.

The Brazilian Sub-region includes all the open plains and pasture lands, surrounded by, or intimately associated with, the forests. Its central mass consists of the great forest plain of the Amazons, from the north-east coast of Brazil to high up in the Andes on the west, a stretch of more than 2,000 miles ; and from the mouth of the Orinoko to near La Paz in the Bolivian Andes, a distance of 1,900 miles, of continuous forest in both directions. Within this area are some open "campos" or patches of pasture lands, along several of the tributaries of the Amazon, and Llanos—open flat plains generally flooded in the wet season—on the northern bank of the Orinoko. Unbroken forest also covers the country from Panama southwards by the Magdalena Valley along the western aspect of the

Andes to Guayaquil. There is a very arid tract on the north-east coast of Brazil; but south of Cape San Roque the coast forests extend to 30° south latitude, "clothing all the valleys and hill-sides as far inland as the higher mountain ranges, and even penetrating up the great valleys far into the interior. To the south-west the forest country reappears in Paraguay, and extends in patches and partly wooded country till it almost reaches the southern extension of the Amazonian forests. The interior of Brazil is thus in the position of a great island plateau, rising out of, and surrounded by, a lowland region of ever-verdant forests." Of its Anthropoid life the Woolly Monkeys (*Lagothrix*), the Sakis (*Pithecia*), and the Uakaris (*Brachyurus*) are confined to its Amazonian forests. The Woolly Spider-Monkeys (*Brachyteles*) keep to the wooded coast-regions of South-east Brazil, while the Titis (*Callithrix*) do not range out of the tropics of South America. The Howlers (*Alouatta*), the Spider-Monkeys (*Ateles*), and the Capuchins (*Cebus*) roam nearly over the whole region—the first and last ranging from Costa Rica to Paraguay as well. The Spider-Monkeys indeed extend over to the west side of the Equatorial Andes, and in Guatemala across to the Pacific coast. No species of Monkey, however, is known to inhabit the western side of the Andes, to the south of the Gulf of Guayaquil.

THE BABOONS, GUEREZAS AND LANGURS. FAMILY CERCOPITHECIDÆ.

With the following account of the numerous species of the genera of this family, we come to consider the first section of the Old World, or Catarrhine* Monkeys. These are distin-

* *κατα*, down; *ῥίς*, *ῥίνας*, nose or nostril.

guished from their New World cousins, described in the previous pages, by many important and obvious characters. The partition dividing the nostrils is narrow, instead of broad, and the openings of the nostrils themselves are directed downwards and outwards. Certain genera possess also sacs formed by distensible folds of the skin in the cheeks. These "cheek-pouches" serve as a storing-place by the side of the jaws, for food which they cannot masticate at the moment. When this store is disposed of, the folds of skin come together again and give no indication of the presence of the pouch, which, moreover, when full does not interfere with the mastication of other food in the mouth, or with the utterance of the animal's usual cries.

The hind-limbs are never shorter than the fore-; they may be equal in length, but they are generally somewhat longer, the animal being more or less quadrupedal, or very partially erect in gait. Their thumb is not invariably present, but when it is, it is always opposable to its fellow digits. The great-toe is never rudimentary, and is never, as it is in Man, the longest, but is the shortest digit of the foot, and it is capable of free motion to and from the others. All of the digits possess nails. The length of the foot among this group approximates more to the proportions of the foot in Man. The hairs on the arms and fore-arms are directed downwards from the shoulder to the wrist.

The tail in this family varies very much; it may be long or short, or even externally absent, but it is never prehensile. All the species, however, possess "callosities," or hard fleshy pads—often of large size—on the buttocks or seat, which, like the naked skin of the face, are usually brilliantly coloured and often of large size. The perineal region and organs are at certain periods, especially in the females, subject to great turgescence and brilliant coloration.

Besides these external characters, we find, on examining their bony structure, much variation in the skull. Some have a rounded forehead, the ascending portion of the lower jaw being high, broad, and flat, with a large facial angle ; in others, we have great production of the upper jaw (the horizontal part of the lower jaw being greater than the ascending portion), and a low facial angle. The cerebral portion of the skull is long and flattened, and the palate long and narrow. The dental formula is $I_{\frac{2}{2}}, C_{\frac{1}{1}}, P_{\frac{2}{2}}, M_{\frac{3}{3}} = 32$, that of the milk-teeth $I_{\frac{2}{2}}, C_{\frac{1}{1}}, M_{\frac{2}{2}}$ (the forerunners of the permanent *pre-molars*) $\frac{2}{2} = 20$, exactly the same as in a Man. The outer lower incisors are equal to, or sometimes smaller than, the inner pair. The permanent canines—which are long and sharp—come in before, or with the posterior molars of both jaws. Between them and the incisors above, and between the canine and the anterior pre-molar below, occurs a gap (or diastema). The anterior upper pre-molar has its outer cusp modified and sharpened ; the anterior lower pre-molar has the anterior margin of its crown so shaped as to work “as a scissors’-blade against the posterior edge of the upper canines.” (*Henley*.) The crowns of the molar teeth are long from before backwards, and their fore and hind cusps are united by transverse ridges, a third being present in the same genera, on the posterior lower five-cusped molar.

The nasal bones are often ossified together to form one bone. The surface of the skull is in general oval and smooth, but in some of the Baboons there appear strong ridges over the eyes (hiding the forehead) and along the top of the head, being stronger, when present, in the male than in the female. The external orifice to the ear has a considerable bony tube, or meatus, a distinguishing character which is absent in the New

World Monkeys ; their tympanic (or ear) cavity being close to the outer wall of the skull. The line of junction (or suture) between the upper jaw-bones, the pre-maxillary and the maxillary, remains unclosed until long after the permanent teeth have come in. Sometimes it remains unclosed throughout life. The foramen for the passage of the spinal-cord, and the condyles for the articulation of the skull with the neck, lie far back.

In the spinal column there are nineteen dorsal and lumbar vertebræ together. The number of caudal vertebræ varies greatly ; in some there are as many as thirty-one, in others only three. The posterior ends of the ischiatic bones of the pelvis are rough, flattened, and broad, for the attachment of the fleshy callosities mentioned above.

The bones of the thigh and leg (*femur* and *tibia*) together, are longer than those of the arm and fore-arm (*humerus* and *radius*) together. The bones of the thumb are modified more for support and progression than for the actions of a true hand ; by these modifications the movements of rotation (pronation and supination) are much restricted.

The ankle (*tarsus*) does not exceed one third of the length of the foot.

The stomach is simple, or but very slightly sacculated, in those genera which possess cheek-pouches ; but is tripartite—the middle compartment being sacculated—in those that have not store-pockets in their mouths, “a groove with raised edges leading from the gullet-entrance to this middle compartment.” The intestine has a cæcum, or blind diverticulum. “When laryngeal air-sacs are developed, they are formed by a single sac, with a median aperture—immediately beneath the epiglottis. This median air-sac is very large, extending down

over the front of the neck, and sending [in some genera] processes into the *axillæ*" or arm-pits. (*Huxley*.)

The main brain (or cerebrum) covers the cerebellum in all the members of the *Cercopithecide*; and in them the principal convolutions and fissures found in the human brain are more or less developed.

The family *Cercopithecide* includes all the Old World Monkeys except the Anthropoid or true Apes, and Man, these latter constituting the two remaining families of the *Anthropoidea*, namely *Simiide* and *Hominide*. The *Cercopithecide* have been again divided into two Sub-families, the *Cercopithecine* and the *Semnopithecine*. The first contains the Baboons (*Cynocephalus*), the Gelada Baboons (*Theropithecus*), the Mangabeys (*Cercocebus*) and the Guenons (*Cercopithecus*), all of which inhabit the African continent; and likewise the Black Apes (*Cynopithecus*) from Celebes, and the Macaques (*Macacus*), which are almost exclusively confined to the Asiatic continent. In the second Sub-family are included the Nosed-Monkeys (*Nasalis*) of Borneo; the Langurs (*Semnopithecus*) of India, Malaizia, and the Sunda Islands; and the Guerezas (*Colobus*) of Africa.

THE BABOONS, MANGABEYS, AND MACAQUES. SUB-FAMILY CERCOPITHECINÆ.

This Sub-family is characterised by the presence, in all its members, of cheek-pouches, and a simple stomach. The tail is variable in length, being long or externally invisible. The callosities on the ischiatic bones are large; in many species they become very turgescient at certain seasons, the enlargement extending sometimes to the tail. The hues of the skin on and round the face also become more vivid periodically.

Many of the species of this Sub-family are arboreal ; some, however, are found only in barren rocky regions ; others in low jungle in the neighbourhood of villages, water-tanks, and cultivated patches. Fruits and insects form their principal diet.

THE BABOONS. GENUS PAPIO.

Papio, Erxleb., Syst. Regne Anim., p. 15 (1777).

Cynocephalus, Lacép., Mem. de l'Inst. iii., p. 490 (1801).

Type, *P. sphinx* (Geoffr.).

The members of this genus may easily be recognised by their very Dog-like face, their muzzle being greatly elongated and truncated at the end, with the nostrils set in the truncated termination. Their eyes are directed downwards along the visage. In form and massiveness of body and in length of tail they vary very much. Their fore- and hind-limbs are nearly equal in length, and consequently they progress on all fours, with the palms of the hands and the soles of the feet flat to the ground. Their "fore-paws" are, however, very efficient *hands*, which some species use very dexterously in turning over stones in their search for food. Their feet are long. Their hair is grizzled or ringed with various colours.

The facial region of the skull is more developed in this genus relatively to the flattened brain-case, than in other Monkeys. In several of the species longitudinal osseous ridges are developed on the bones of the upper jaws, especially in the adult males, adding to the hideousness of the countenance of these animals. The neck is elongated. The *radius* is longer than the *humerus* (or arm-bone), and the elbow projection of the *ulna* (of the fore-arm), named the *olecranon* process, is prolonged upwards beyond what occurs in Man. The thumb, though relatively shorter than in Man, is much

longer proportionately than in other Monkeys, reaching to the middle of the first joint of the forefinger.

Both halves of the liver are much sub-divided.

Gestation lasts seven months, and the young are suckled for six months.

The Baboons are the lowest of the Catarrhine or Old World Monkeys. Most of them are large, ferocious, dangerous, and gregarious animals, and when disturbed or alarmed they give utterance to screams, barks, and guttural murmurs.

Both Dr. Emil Holub and Sir Richard Burton have spoken of the ferocity of the Baboons. "The South African farmers," says the first-named naturalist, "complain of these animals as a great and perpetual nuisance." They were always on the look-out, and no sooner was a field or a garden left unguarded than they would be down at once, breaking through the hedges and devouring the crops. They were likewise very destructive amongst the Sheep. If a shepherd happened to leave his post for ever so short a time, or even to fall asleep, the Baboons, who had been watching their chance from the heights, would be down upon the flock in the valley, and, seizing the Lambs and ripping up their stomachs with their teeth, would feast upon the milk they contained, then leaving the poor mangled victim writhing on the ground. Then they would lose no time in repeating the terrible operation upon another. "About the middle of the morning," says Dr. Holub, "we started eastwards in the hope of catching the herd at their drinking-place. . . . When we had advanced some distance along the hill we found ourselves approaching the pool . . . and could distinctly hear the hoarse barking of the Baboons. Looking across to the opposite side, about 300 yards away, we caught sight of a herd of seven, only four of them full-grown ;

they seemed to pause and scan us carefully before they decamped to a glen on the right. With all speed we followed them. . . . As one of our party had only small shot, and the other nothing but a stick, I insisted upon their remaining close at my side, knowing that a full-grown Baboon, when infuriated, is as dangerous a foe as a Leopard. . . . Behind one of the embankments we took our position. Only a few minutes had elapsed when we could distinctly recognise them as a herd of Baboons. The boy said he was quite sure that they were on their way to the water ; but to our surprise they did not make any further advance. A quarter of an hour passed—half an hour—still no symptom of their approach. All at once, as if they had started from the earth by magic, at the open end of the pond, not sixty yards from our place of ambush, stood two huge males. . . . Being anxious to watch the movements of the animals I refrained from firing, and determined to see what would follow next. Both Baboons sprang towards the water, and leaning down, drank till they were satisfied ; then, having gravely stretched themselves, they stalked away solemnly on all fours in the direction of the herd. There was little doubt, therefore, that they had been sent forward to reconnoitre ; for as soon as they got back, the entire herd put itself in motion, and made its way towards the pond. There were mothers taking care of their little ones ; there were the half-grown animals, the boys and girls of the company ; but there did not seem to be more than three or four full-grown males. At first only one Baboon at a time came to the water's edge, and having taken its draught retired to the rest ; but when about ten of them had thus ventured separately, they began to come in small groups, leaving the others rolling and jumping on the sand. . . . It was not

long before two males—the same, I had no doubt, which we had noticed before—came and squatted themselves one on each side of the little creek. . . . Crack went my rifle. But instead of either of them dropping, the two Baboons started up; by a mutual instinct they both clutched their noses, gave a ringing bark and scampered off. The whole herd took the alarm, and joining in the shrieking clamour were soon lost to sight.”

On another occasion Dr. Holub and his servant had a *rencontre* with a herd of Baboons. He writes:—“We caught sight of them in one of the glens. They were on the further side, and being anxious to obtain a specimen of their skulls, I fired and killed one Baboon; but unfortunately for me, the creature fell into the river. At my second shot I wounded two more. This induced the right wing of the herd to retreat; but the main body kept their ground, and the left flank, moreover, assumed the aggressive, and commenced pelting us so vigorously with stones, that, remembering that I had only one cartridge, I considered it far more prudent to withdraw than to run the risk of a hand-to-hand encounter.” On a still further occasion the same well-known traveller says: “I was turning to leave the ravine when some stones came pattering down the rocks in my direction. I soon became aware that the stones were being designedly aimed at me; and, looking up, I saw a herd of Baboons.”

“The Nyanyi or Cynocephalus,” writes Sir Richard Burton in his “Lake Regions of Central Africa,” “in the jungles of Usukuma attains the size of a Greyhound, and, according to the natives, there are three varieties of colour—red, black and yellow. They are the terror of the neighbouring districts; women never dare to approach their haunts; they set the

Leopard at defiance, and when in a large body, they do not, it is said, fear the Lion."

"Baboons often show their passion," as Mr. Darwin has related, "and threaten their enemies in a very odd manner, namely, by opening their mouths widely, as in the act of yawning. Mr. Bartlett has often seen two Baboons, when first placed in the same compartment, sitting opposite to each other, and then alternately opening their mouths; and this action seems frequently to end in a real yawn. Mr. Bartlett believes that both animals wish to show to each other that they are provided with a formidable set of teeth, as is undoubtedly the case. As I could hardly credit the reality of this yawning gesture, Mr. Bartlett insulted an old Baboon and put him into a violent passion; and he almost immediately thus acted.

. . . Baboons likewise show their anger, as was observed by Brehm with those which he kept alive in Abyssinia, in another manner, namely, by striking the ground with one hand, 'like an angry man striking the table with his fist.' I have seen this movement with the Baboons in the Zoological Gardens; but sometimes the action seems rather to represent the searching for a stone or other object in their beds of straw.

. . . With several species of Baboons, the ridge of the forehead projects much over the eyes, and is studded with a few long hairs, representing our eyebrows. These animals are always looking about them, and in order to look upwards they raise their eyebrows. They have thus, as it would appear, acquired the habit of frequently moving the latter. However this may be, many kinds of Monkeys, especially the Baboons, when angered, or in any way excited, rapidly and incessantly move their eyebrows up and down, as well as the hairy skin of their foreheads."

Baboons are confined to the African continent and to Arabia, to the region, indeed, termed Ethiopian, as defined by Sclater and Wallace. They live chiefly on the ground, especially in rocky and barren hills, and less frequently among trees, for which their equally long front and hind limbs are not so well adapted. Mr. H. H. Johnson, C.B., now H.M. Commissioner in Nyasa-land, found, however, on his Kilimanjaro Expedition, that Baboons were singularly abundant in the big trees at Taveita, on the rise to that mountain. Their food consists of fruits and Lizards, but principally of insects, which they search for under stones, turning these over with their hands. They are, indeed, nearly omnivorous, as the reader will have gathered from Dr. Holub's observations.

I. THE MANDRILL. *PAPIO MAIMON.*

Simia maimon, Linn., Syst. Nat., p. 35 (1766).

Simia mormon, Altstr., Acta. Noem., p. 144, pl. 3 (1766).

Papio maimon, Erxl., Syst. Regne Anim., p. 17 (1777); Schl., Mus. Pays Bas, vii., p. 130 (1876).

Cynocephalus mormon, Fr. Cuvier, Hist. Nat. Mammif., pp. 143, 146, pls. 52, 53 (1807).

Papio mormon, Geoffr., Ann. Mus., xix., p. 104 (1812).

Mormon maimon, Gray, Cat. Monkeys, Brit. Mus., p. 36 (1870).

Characters.—**Male.**—Body massive and strong; trunk declining backwards; head disproportionately large; muzzle much elongated and protruding, with large longitudinal rugose swellings along each side when full grown; mouth large, and with very animal-like lips; brows strongly projecting over the base of the nose and the small, approximated, deep-set eyes;

ears black, naked, and pointed ; under-jaw heavy ; tail carried erect, very short, two inches long, and naked beneath ; limbs short and powerful ; the Dog-like nose shorter than the upper lip ; nostrils large. Hair rising from the ridge on the lower edge of the brow to a crest on the top of the head, descending into a mane on the back of the head and neck ; hair of the body bristly ; chin bearded ; whiskers proceeding from over the cheek-bones and from under the outer corner of the eyes, long, and directed from the face ; the very large callosities, parts of the rump in their neighbourhood, and the inside of the thighs naked. Hands and feet naked.

Skull very massive, having numerous strong muscular crests ; the jaws and teeth very powerful, especially the canines, which are huge ; the forehead flat and the brain-case small, and further reduced by the great projection backward of the orbits. The cheek-bones enormously swollen along the side of the nose ; in the neck a large air-sac. The back-bone has to some extent the peculiar double curve characteristic of the human vertebral column ; but in the conformation of certain of their vertebræ a similarity to the lower quadrupeds, especially to the Carnivora, is seen in the Mandrill, in accordance with their quadrupedal mode of progression. The metacarpal bones, except that of the thumb, are all of the same length, while in the Man-like Apes they are unequal. The thumb is much restricted in its motions on account of the disposition of certain of the muscles of the hand. The pectoral and pelvic muscles are strongly developed.

Face-ridges bright blue, with purple in the intervening furrows. The bridge of the nose (after the development of the permanent teeth) red, the tip scarlet ; lips greyish-black.

General colour of fur black, fringed with yellow ; centre of the crown of head, crest, nape (extending down the back), and sides of the body black ; beard citron-yellow ; callosities and surrounding naked skin violet ; genital and anal regions scarlet.

Female and Young Male.—Facial rugosities less marked outwardly, as well as on the skull, than in the adult male, and the purple colour of the grooves wanting. The nose is black, not scarlet.

A hybrid between a female of this species and a male Macaque (*M. cynomologus*) was born in the Zoological Gardens of London in October, 1878.

Distribution.—West Africa, from Senegambia to the Congo.

Habits.—These hideous and extraordinary animals live together in large companies, and are a terror to the natives. They are less ill-dispositioned when young, but when adult, they are very savage. They are nearly omnivorous, but fruits and insects form their chief food. When the Mandrill is in any way excited, the brilliantly-coloured naked parts of the skin are said to become still more vividly coloured.

II. THE DRILL. *PAPIO LEUCOPHÆUS*.

Simia leucophæa, F. Cuvier, Ann. Mus., ix., p. 477, pl. 37 (1807) ; id. Hist. Nat. Mamm., livr. iv., p. 637 (1807).

Papio leucophæa, Gray, List Mamm., Brit. Mus., p. 10 (1843).

Cheropithecus leucophæus, Gray, Cat. Mamm., Brit. Mus., p. 35 (1870).

Papio leucophæus, Schl., Mus. Pays Bas, vii., p. 131 (1876).

(Plate XXII.)

Characters.—Somewhat similar to *C. maimon*, but body less



THE DRILL.

robust, the limbs more slender. Face-swellings with only two furrows ; crest and mane less prominent ; whiskers encroaching on the face less than in the Mandrill ; beard slightly shorter ; ears naked, pointed ; tail very short, erect, covered with hair all round ; the hair round the head, shoulders and sides of body, in a band below the chin, on the under surface of the body, and the outer surface of the limbs, long and fine ; muzzle long and truncated, the nostrils placed at its extremity, and somewhat tubular ; fingers and toes naked.

Face entirely black, without bright coloration ; general colour of fur brown, approaching that of the Mandrill, but washed with greenish on the upper parts, and the shoulders darker. The hairs on the top of the head, on the back, and wherever the greenish colour appears, are grey at the base, alternating with black and yellow, thus producing the greenish coloration ; a band from the throat to behind the ear greyish ; the whole of the under surface and inner side of the limbs greyish-white ; beard and whiskers greyish-white, washed with greenish ; hands and feet reddish-purple ; callosities bright scarlet.

Young Male.—Smaller ; face-swellings less marked ; fur and beard more washed with greenish ; neck-band paler grey ; whiskers paler ; callosities not scarlet.

Female.—Like the young male, but the head shorter, and the callosities scarlet ; the head and shoulders less haired ; the grey neck-band absent ; fur in general paler ; the greenish hue less marked except on the head and limbs ; the fur predominating on the lower part of the back and flanks.

Distribution.—The Drill is confined to West Africa.

Habits.—Little is known of the habits of the Drill. It has

the reputation of being good-tempered when young, and of being, when old, ferocious, like the Mandrill.

III. THE DOGUERA BABOON. *PAPIO DOGUERA*.

Cynocephalus babouin, Rüpp., Neue Wirb. Säugeth., i., p. 7 (1835, in part).

Cynocephalus doguera, Pucher. et Schimp., Rev. et Mag. de Zool., 1856, p. 96, 1857, p. 57.

Cynocephalus porcarius, Fitz. et Heugl., Syst. Uebers., 1866, p. 6 ; var. Gray, Cat. Monkeys Brit. Mus., p. 64 (1870).

Papio doguera, Schl., Mus. Pays Bas, vii., p. 126 (1876).

Characters.—Face naked ; tail moderately long, terminating in a tuft of hairs. General colour of fur olive-brown, or yellowish-olive, the hairs being ringed alternately with black and orange, or brownish-yellow, bars, for their outer third ; body and outer surface of hind-limbs and tail olive-brown, the brown predominating ; sides of head, under surface of body, and inner surface of limbs pale yellow ; hands and feet dark brown or black. Length of body, 38 inches ; of tail, 20 inches.

The canine teeth are very large, and the lower jaw very heavy. Distinguished from *C. porcarius* by its much lighter colour.

Distribution.—The interior of Abyssinia.

Habits.—This very rare Baboon, of which only a very few specimens are known, was brought by Schimper from Central Abyssinia. He states, according to Dr. Slack, that these animals are gregarious, as he met with them in troops of from one to two thousand individuals. They hunt their prey, which consists mainly of small Ruminants, in a manner similar to that of a pack of Hounds, following the quarry till it is exhausted by fatigue, and then capturing and devouring it. It

is also stated that the Lion and the Leopard are unknown in the region inhabited by this Baboon. A glance at the animal under consideration would convince anyone that it is of a most ferocious disposition. Mr. Schimper also informs us that it wages continual war against the Gelada Baboon (*Theropithecus gelada*) which inhabits the same locality.

IV. THE CHACMA BABOON. *PAPIO PORCARIUS*.

Simia porcaria, Bodd., Naturf., xxii., p. 17, figs. 1, 2 (1787).

Cynocephalus porcarius (Le Chacma), F. Cuv., Hist. Nat. Mamm., p. 132, pl. 47 (? 1807); Gray, Cat. Monkeys Brit. Mus., p. 34 (1870).

Papio comatus, Geoffr., Ann. Mus., xix., p. 103 (1812).

Papio porcarius, Geoffr., Ann. Mus., xix., p. 102 (1812); Schl., Mus. Pays Bas, vii., p. 124 (1876).

Cynocephalus ursinus, Schinz, Synops. Mamm., i., p. 64 (1844).

Characters.—Face and ears naked; muzzle protruding, the nose extending beyond the upper lip; the hair of the body long and shaggy, lengthening on the shoulders and the neck, but not forming a conspicuous mane; whiskers small and directed backwards; tail slightly exceeding half the length of the body, elevated at its base, and then descending perpendicularly; callosities small; hands and feet naked. Sense of smell acute.

Skull flattened, the cranial portion smaller than the facial; ridges above and at the sides of the close-set orbits very large; nasal bones long and prominent; canine teeth very large and triangular.

General colour dark brown or nearly black, washed with green, especially on the forehead, the hairs being grey at the base, then ringed alternately with black and green; some of

them, however, lighter. Head, arms, and legs black ; face, hands, feet, and ears dark blue ; a white ring encircling each eye ; upper eyelids white ; whiskers grey.

Female and Young Male.—Similar to the adult male in wanting a conspicuous mane ; head rounder ; nose less protuberant ; cranial portion of skull less conspicuously disproportionate to the facial portion.

Distribution.—This species inhabits South Africa ; and in the Cape Colony it is found in large troops.

Habits.—The Chacma, which is the largest of all the Baboons, lives, like the others, in troops, consisting of nearly a hundred individuals. They inhabit rocky places, and apparently prefer country broken into steep cliffs and rocky crags, very often in the neighbourhood of the sea. The Chacmas are very ferocious and dangerous, and in captivity, when fully adult, extremely jealous, but when young they are said to be playful and well-dispositioned. They are, moreover, very intelligent. Their sense of smell, especially for hidden water-springs in dry and arid districts, is said to be remarkable. “An animal,” says Le Vaillant, in his “Travels in Africa,” “that rendered me more effectual services ; which, by its useful presence, suspended and even dissipated certain bitter and disagreeable reflections that occurred to my mind ; which, by its simple and striking instinct, seemed to anticipate my efforts ; and which comforted me in my languor—was an Ape, of that kind so common at the Cape, under the name of *Cawiaars*. As it was extremely familiar, and attached itself to me in a particular manner, I made it my taster. When we found any fruit or roots unknown to my Hottentots, we never touched them until my dear Kees [the Chacma] had first tasted them ; if it refused them, we

judged them to be either disagreeable or dangerous, and threw them away." The food of the "Chacma," an Anglicised form of the Hottentot name for this Baboon, consists of Lizards, Scorpions, Centipedes, and all manner of insects; birds' eggs, gum, and honey are particularly relished by it. When these are difficult to find, it searches for the bulbous roots of certain liliaceous plants, of which it is very fond, and which it very ingeniously disinters. As Le Vaillant has recorded of the same individual to which we have just referred: "He laid hold of the tuft of leaves with his teeth, and pressing his four paws firmly against the earth, and drawing his head backwards, the root generally followed; when this method did not succeed, he seized the tuft as before, as close to the earth as he could, then throwing his heels over his head, the root always yielded to the jerk he gave it."

V. THE YELLOW BABOON. PAPIO BABUIN.

Le petit papion, Buffon, Hist. Nat. Mamm., xiv., pl. 14 (1766).

Papio cynocephalus, Geoffr., Ann. Mus., xix., p. 102 (1812); Schl., Mus. Pays Bas, vii., p. 127 (1876).

Cynocephalus babouin, Desm., Mamm., p. 68 (1820); (Le babouin), F. Cuvier, Mem. du Mus., iv., p. 419, pl. 19 (1818); id. Hist. Nat. Mamm., livr. iv. (1819); Is. Geoffr., Arch. Mus., ii., p. 579, pl. 34 (1841); Gray, Cat. Monkeys Brit. Mus., p. 35 (1870).

Simia cynocephala, Fischer, Synop. Mamm., p. 33 (1829).

Cynocephalus anubis, var. Wagner in Schreb., Säugeth., Suppl., v., p. 63 (1855).

Characters.—Adult Male.—Snout elongate, not surpassing the upper lip; nostrils large, round, separated by a longitudinal furrow above; tail shorter than the body, haired throughout its

length; curved upwards at the root, and then descending straightly; no mane; hair of crown elongated, a large tuft directed backwards on each cheek, forming large whiskers.

General colour of fur brownish-yellow; ears nude, coloured like the face; face livid flesh-colour, deeper round the eyes; upper side of body uniform brownish-yellow, the hairs being ringed alternately with broader yellow and narrower black bars; sides of body somewhat darker; throat and under side paler yellow than above: whisker-tufts pale citron-yellow; hands and feet like the back in colour, their naked parts like the face.

Young Male.—Coloration of upper parts similar to that of the adult male, but paler underneath; the snout less protuberant.

Distribution.—This species inhabits Western Abyssinia, Nubia (Dongola), and the Soudan (Sennaar), at elevations of from 2,000 to 5,000 feet. It also occurs on the West Coast of Africa—having been brought from the Coanza river by the late Captain Cameron, R.N.; in East Africa Mr. H. H. Johnston has observed it on Mount Kilimanjaro; while from the remarks of Sir John Kirk given below it would seem to extend also as far south as the Zambesi (Tete).

Habits.—Very little is known of the habits of the Baboons in a state of nature; but it is probable that this species does not differ materially in its ways and manners of life from those of its near relations described in the preceding pages. Sir John Kirk says that in some parts of Africa, such as Tete, Batoko, and Rovuma it is considered to be a sacred animal by the natives, and is thus unmolested.

VI. THE ANUBIS BABOON. *PAPIO ANUBIS*.

Cynocephalus anubis, F. Cuvier et Geoffr., Hist. Nat. Mammif., vol. iii., livr. 50 (1825).

Cynocephalus anubis, Waterh., Mamm., Zool. Soc. Lond. (2), p. 8 (1838); Gray, Cat. Monkeys Brit. Mus., p. 34 (1870).

Cynocephalus olivaceus, Is. Geoffr., Cat. Méth. Primates, p. 34 (1851); id. Arch. Mus., v., p. 543, note (1848).

Papio anubis, Schl., Mus. Pays Bas, vii., p. 125 (1876).

Characters.—Snout very elongated; nape of the neck crested. Face black; general colour uniform olive-green; the hairs being grey at the base and ringed higher up with bars of black and yellow; arms and legs like the back; the naked hands and feet flesh-colour.

Distribution.—Interior of West Africa. Lagos, in the Bight of Benin, is the port from which this species is generally shipped to Europe.

Habits.—The Anubis Baboon is not a common species in captivity, as the natives are terribly afraid of its strength and ferocity. The animals wander about in companies, inhabiting chiefly the dry, rocky, mountainous regions in the interior of West Africa, feeding on the peculiar vegetation that they find there; digging up the roots of grasses, and gnawing with their strong jaws the roots and stems of an extraordinary short, woody, top-shaped plant, known as *Welwitschia*, which produces in its youth two leaves, and never more in its lifetime, though attaining to a great age. They feed also on the *Scytonema*, a moisture-storing plant, which grows only on rocks. Though affecting dry, rocky regions from choice, the Anubis Baboons often descend in large hordes to the cultivated country, and ravage the gardens of the natives.

Mr. Darwin, in describing the expression of pleasure, joy, and affection in Monkeys, observed that, when they were pleased, the form of the lips differed a little from that when they were angered. In the case of an Anubis Baboon which was first

insulted and put into a furious rage by his keeper, who afterwards made friends with him, Mr. Darwin relates that, "as the reconciliation was effected, the Baboon rapidly moved up and down his jaws and lips, and looked pleased. When we laugh heartily, a similar movement or quiver may be observed more or less distinctly in our jaws ; but with Man the muscles of the chest are more particularly acted on ; whilst with this Baboon, and with some other Monkeys, it is the muscles of the jaws and lips which are spasmodically affected."

VII. THE THOTH BABOON. *PAPIO THOTH.*

Cynocephalus thoth, Ogilby, P. Z. S., 1843, p. 11 ; Frazer, Zool. Typica, pl. 5 ; Gray, Cat. Monkeys Brit. Mus., p. 35 (1870).

Cynocephalus babuin (nec Desm.), Rüpp., Neue Wirbelth. Säugeth., p. 7 (1835-1840).

? *Papio hamadryas*, Schl., Mus. Pays Bas, vii., p. 129, 1876, in part.

Characters.—**Male.**—Body massive, thick-set ; face broad ; cheek-bones protuberant ; the nostrils placed at the extremity of the truncated snout ; nose as long as, but not exceeding, the upper lip. Hair of head and neck longer and thicker than on the rest of the body, but not forming a mantle-like mane as in *C. hamadryas* ; the hair of the legs and outer portion of the thighs and of the toes long ; whiskers not intruding far on the face, and directed backwards, less copious than in the Arabian Baboon ; ears naked, pointed ; soles and palms also naked ; callosities large, hips naked. Tail nearly the length of the body, not tufted at the termination.

In colour somewhat similar to *C. sphinx*, and closely allied to *C. babuin*. Face livid flesh-colour, lighter on the ridge of

the nose. General colour of fur on back, sides of body, and outer side of limbs olive-green ; on the under side of the body and inner side of the limbs light yellowish-green ; breast, throat, and under part of chin silvery-grey ; whiskers silvery-grey ; ears, palms of hands, and soles of feet dark brown ; callosities flesh-coloured ; the surrounding naked parts purple-brown.

Distribution.—Abyssinia.

Habits.—Little or nothing is known of this species. It was obtained in Abyssinia by Dr. Rüppell. A specimen was exhibited alive, however, in the Zoological Gardens of London in 1843.

VIII. THE EAST AFRICAN BABOON. *PAPIO IBEANUS*.

Papio thoth ibeanus, Oldfield Thomas, Ann. and Mag. Nat. Hist., xi., p. 46 (1893).

Distribution.—Lamu, East Africa.

Mr. Oldfield Thomas has described this sub-species, which has remarkably coarse and shaggy fur all over the body, longer than in the typical form, and of a blackish and dull tawny white, without any of its brighter yellow ; the hairs on the crown of the head broadly ringed with black ; the chin and throat whitish ; hairs of the chest ringed with black and white ; the belly black and dull fawn ; the inner side of the fore-limbs like the chest, and of the hind-limbs clearer and less ringed fawn-colour. Length of the body, $33\frac{1}{2}$ inches ; of the tail 24 inches.

IX. THE GUINEA BABOON. *PAPIO SPHINX*.

Le papion, F. Cuvier, Mamm., vol. i., livr. 6 (♂) ; livr. 7 (♀), Hist. Nat. (1819).

Papio sphinx, Geoffr., Ann. Mus., xix., p. 103 (1812) ; Schl., Mus. Pays Bas, vii., p. 127 (1876).

Cynocephalus papio, Desmar., Mamm., p. 69 (1820).

Cynocephalus choras, Ogilby, P. Z. S., 1843, p. 12.

Papio rubescens, Temm., Esquisses Zool., p. 39 (1853); Schl., t. c. p. 28.

Cynocephalus sphinx, Gray, Cat. Monkeys, Brit. Mus., p. 35 (1870).

Characters.—Male.—Snout tapering, longer than the upper lip; face, ears, palms and soles of feet naked; whiskers bushy, directed backwards, nearly hiding the quadrangular ears; tail of the form usual in this genus, shorter than the body. Hair on back of the neck longer than on the body; facial ridges present, but not very prominent; hinder part of belly, inside of limbs, and chin, throat, and breast very scantily haired.

Face, ears, naked parts of hands and feet, black; upper eyelids white; fur of head, back, and limbs in general brownish-yellow—the hairs being ringed with alternate bars of black and light-brown; cheeks and whiskers fawn-coloured; throat and under side of body paler. Scrotum, callosities, and naked parts of buttocks bright flesh-coloured, but not so bright as in *C. hamadryas*. Length of body (in young male), 27 inches; of tail, 20 inches.

Female and Young Male.—Similar to adult males in coloration; but less thick-set, and with a shorter muzzle.

Distribution.—The Guinea Baboon inhabits West Africa from Senegal and the Niger to Central Africa. In East Africa, Mr. H. H. Johnston observed it in the inhabited region of Kilimanjaro.

Habits.—Little is known of the habits of this species; but it is improbable that it departs widely from those of the other

members of the genus. In regard to the bright coloration of the callosities and posterior parts of this and other Baboons, Mr. Darwin remarks: "In the discussion on sexual selection in my 'Descent of Man,' no case interested and perplexed me so much as the highly-coloured hinder ends and adjoining parts of certain Monkeys. As these parts are more brightly coloured in one sex than the other, and as they become more brilliant during the season of love, I concluded that the colours had been gained as a sexual attraction. . . . I had, however, at that time no evidence of Monkeys exhibiting this part of their bodies during their courtship. . . . I have lately read [in an article by J. von Fischer, of Gotha, published in April, 1876] an account of the behaviour of a young male Mandrill when he first beheld himself in a looking-glass; and it is added, that after a time he turned round and presented his red hinder end to the glass. Accordingly I wrote to Herr J. von Fischer to ask what he supposed was the meaning of this strange action. He says that he was himself at first perplexed . . . and was thus led carefully to observe several individuals of various other species of Monkeys, which he has long kept in his house. He finds that not only the Mandrill (*C. mormon*) but the Drill (*C. leucophaeus*) and three other kinds of Baboons (*C. hamadryas*, *C. sphinx*, and *C. babuin*) . . . turn this part of their bodies, which in all these species is more or less brightly coloured, to him when they are pleased, and to other persons as a sort of greeting. . . . From these facts von Fischer concludes that the Monkeys which behaved in this manner before a looking-glass . . . acted as if their reflection were a new acquaintance. . . . It deserves especial attention that von Fischer has never seen any species purposely exhibit the hinder part of its body, if not at all

coloured. . . . With respect to the origin of the habit, it seems to me probable that the bright colours, whether on the face or hinder end, or as in the Mandrill, on both, serve as a sexual ornament and attraction. . . . The fact that it is only the Monkeys (with those parts brightly coloured), which as far as at present known, act in this manner as a greeting towards other Monkeys, renders it doubtful whether the habit was first acquired from some independent cause, and that afterwards the parts in question were coloured as a sexual ornament; or whether the colouring and the habit of turning round were first acquired through variation and sexual selection, and that afterwards the habit was retained as a sign of pleasure, or as a greeting, through the principle of inherited association."

X. THE ARABIAN BABOON. *PAPIO HAMADRYAS*.

Simia hamadryas, Linn., Syst. Nat., i., p. 36 (1766).

Le tartarin, F. Cuvier and Geoffr., Mamm., vol. i., livr. 5 (1819).

Cynocephalus hamadryas, Fr. Cuvier, Hist. Nat. Mammif., p. 129, pl. 46 (♂).

Papio hamadryas, Geoffr., Ann. Mus., xix., p. 103 (1812); Schl., Mus. Pays Bas, vii., p. 129 (1876, in part).

Hamadryas ægyptiaca, Gray, Cat. Monkeys Brit. Mus., p. 34 (1870).

Characters.—**Male.**—Size of a large Pointer Dog; muzzle long; nose slightly longer than the upper lip; nostrils terminal, separated by a furrow above and in front; face naked, the ridges parallel to the nose, and far less prominent than in the Mandrill or Drill; eyes deep-set; brows overhanging; ears naked; a large mane, mantle-like, on the throat, neck,

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care of the young, the smaller Monkeys amusing themselves by gambolling about." The Arabian Baboon climbs heavily, but when moving quickly on the ground has a regular steady gallop.

This is the Sacred Monkey of the ancient Egyptians, and its likeness is often found engraved on their various temples and monoliths. "The Cynocephalus Ape," as Sir Gardner Wilkinson writes, "which was particularly sacred to Thoth, held a conspicuous place among the sacred animals of Egypt, being worshipped as the type of the God of Letters, and of the Moon, which was one of the characters of Thoth. . . . Sometimes a Cynocephalus placed on a throne as a god, holds a sacred Ibis in his hand; and in the judgment-scenes of the dead it frequently occurs, seated on the summit of a balance, as the emblem of Thoth, who had an important office on that occasion, and registered the account of the actions of the deceased. The place where this animal was particularly sacred was Hermopolis, the city of Thoth. In the necropolis of the capital of Upper Egypt, a particular spot was set apart as the cemetery of the Sacred Apes."

XI. LANGHELD'S BABOON. *PAPIO LANGHELDI*.

Cynocephalus langheldi, Matschie, S. B. Ges. Nat. Freunde, Berlin, 1892, p. 233.

Characters.—Hair of back long and coarse; that of the hinder quarters shorter. Length of body, $29\frac{1}{2}$ inches; of tail, 18 inches.

General colour, dirty olive-grey—the hairs brown at the base, then yellowish-grey, ringed further up with black and yellowish-grey and tipped with black; the long and coarse hair

of the back lighter ; chin greyish-white ; the hind-limbs externally washed with brownish-yellow ; the upper side of the hands and feet olive-yellow ; tail brownish-grey ; under side of body and inside of limbs silvery-grey.

The bright olive-grey of the upper side and the silver-grey under side distinguish this species from all others ; it is most nearly related to *C. babuin*.

Distribution.—East Africa, from the Rovuma river to the Pangani, and extending to the Victoria Nyanza.

THE GELADA BABOONS. GENUS THEROPITHECUS.

Theropithecus, Is. Geoffr., Arch. Mus., ii., p. 576 (1841).

This genus has been established for the reception of two species which differ from the true Baboons (*Cynocephalus*) in having the nostrils placed on the side of the snout, instead of being terminal and opening, Dog-like, on the blunt face of the truncated nose.

I. THE GELADA BABOON. THEROPITHECUS GELADA.

Macacus gelada, Rüpp., Neue Wirbelth. Säugeth., p. 5, pl. 2 (1835) ; Schl., Mus. Pays Bas, vii., p. 107 (1876).

Theropithecus gelada, Is. Geoffr., Arch. Mus., ii., p. 576 (1841).

Theropithecus senex, Schimp. et Puch., Rev. et Mag. de Zool., 1857, p. 51.

Gelada rüppellii, Gray, Cat. Monkeys Brit. Mus., p. 33 (1870) ; Garrod, P. Z. S., 1879, p. 451.

Characters.—**Male.**—Body large and massive ; head oblong ; face produced, rounded, and nude below the superciliary ridge ; nose long and depressed in its middle region, but elevated at

the tip upon the deep upper lip ; head crested, with long hair, rising from the superciliary ridge, and descending to a long and mantle-like mane on the back of the neck and shoulders, where the hair is longest, down to the loins behind, and as far as the elbow joints in front ; whiskers very long, directed backwards over the ears, and downwards from the corners of the mouth ; no beard ; chin nude ; a patch on the chest and one on the throat naked, separated from each other by a haired bar $1\frac{1}{2}$ inches broad ; tail long, round, erect for its basal third, then falling straight down as in other Baboons, and terminating in a long thick tuft.

Face, hands, feet and callosities deep black ; nude chest-spaces florid ; hair of whiskers, neck-portion of mane, sides arms, and lower margins of the mantle-like mane dark sooty chocolate-brown ; breast, chest, shoulders, fore-arms, hind quarters and tail (except the terminal tuft) black ; tail-tuft brownish-black, with a few white hairs ; abdomen paler brown than the hair generally, though still dark ; hair bordering the nude chest-spaces iron-grey from the presence of numerous short grey and white hairs ; nipples close together on the lower nude chest-space ; nails of hands longer than those of the feet. Length of the body, 29 inches ; of tail, $24\frac{3}{4}$ inches ; to tip of terminal tuft, 32 inches.

Skull shorter than in *Cynocephalus* ; canine teeth very large ; posterior lower molars with a large fifth cusp ; upper molars with a large front talon ; cranial crests strongly developed ; nasal bones high, narrow, separate, and not fused together.

The affinities of *T. gelada* are more with *Cercopithecus* than with *Cynocephalus*, and still less with *Macacus*.

Young Male.—Similar to the adult, but the mane shorter, and more curly ; and the brown colour, wherever it occurs in the male, is lighter in colour.

Female.—Coloured like the young male, but smaller than the adult male, and with shorter hair, darker at the tips ; hair longest between the shoulders ; loins paler than in the male ; nude chest and throat-spaces united into one, which is carunculated along its borders, and without white hairs along the margins ; callosities carunculated.

Distribution.—Southern Abyssinia ; in the provinces of Heremat and Godjan.

Habits.—The habits of the “Gelada,” as it is named by the natives of its own country, are similar to those of the Baboons (*Cynocephalus*). They live in large companies, and when full-grown—the males especially—are very ferocious, pugnacious, and dangerous. It is a common habit of these animals to roll down stones from the rocky cliffs amid which they live, upon any approaching animal—the Arabian Baboon being an especial object of their animosity. Their food consists of all sorts of fruits, as well as grass, and the cultivated crops of the natives. They are chiefly found in barren rocky regions, ascending the mountains to an altitude of from 7,000 to 8,000 feet above the sea.

II. THE DUSKY GELADA. *THEROPITHECUS OBSCURUS*.

Theropithecus obscurus, Heuglin, Act. Acad. Leop., xxx., Nachtrag, p. 10 (1863) ; Schl., Mus. Pays Bas, vii., p. 107 (1876).

? *Theropithecus senex*, Schimper et Puch., Rev. Zool., 1857, p.

Characters.—Nearly allied to *T. gelada*, but distinguished by its darker colour, the flesh-coloured ring round the eyes, and the two naked spots on the chest at the base of the neck, surrounded by white hairs, extending to the inner side of the arm.

Face naked, the chin thinly haired, the nose-pad situated behind the blunt and broad end of the muzzle ; eyes small, set close together, deep sunk beneath the prominent overhanging frontal ridges ; ears small ; sides of the head entirely covered with woolly hair ; mane long, soft, and thick. Length of body, 53 inches ; tail, 26 inches.

Face black, but with a broad flesh-coloured ring round each eye ; scanty hairs on the chin white ; top of head and back dark brown ; mane on fore-neck and shoulders, arms, and hind part of the hands pure black ; sides of head and neck, rump, and tail dirty ochre ; naked spots on breast dark flesh-coloured, more vivid in passion ; breast and inner side of fore-arm, and middle of chest white ; rest of under surface pale brown. Callosities bluish-grey.

Female and Young.—Almost uniform fulvous, but the mane less marked.

Distribution.—North-east Africa ; on the eastern boundary of Abyssinia, near the sources of the Takazze river, on the confines of the Galla country. Dr. Blanford observed it also near Magdala.

Habits.—This large and “stately” Baboon, known to the natives as “Tokur-Sinjero” (or Black Baboon), lives in large troops in the high mountains of Abyssinia, at an altitude of from 6,000 to 10,000 feet. It is seldom seen among trees, but generally in open plains, or in inaccessible rocky cliffs, from which it hurls stones on anyone who dares to approach.

During the night these Baboons hide together in holes in the rocks, whence, on the return of the morning sun, they emerge and sit warming themselves, before starting on their marauding expeditions in the cultivated fields, or in the vegetation which clothes the sides of the deep valleys, where they feed largely on the leaves of the trees. Their disposition is, among themselves, harmless. As a rule two to six year old males lead with grave strides a herd of twenty to thirty females and young, the latter now playing with each other, and scampering about the troop, now carried by their mothers, and sometimes pinched and boxed on the ears by them. As soon as, but not before, the leader has assured himself of any danger, he utters a gentle bark, to which the whole troop responds and retreats back into safety among the rocks. The old males then stand on their hind-feet barking and displaying to the intruder their long white teeth. On their marauding expeditions, or when in flight, they do not usually exhibit great haste, the whole troop generally going in single file with an old Sultan bringing up the rear. Often several troops mingle together during the day, but at nightfall each returns to its own headquarters.

Their cry is a sharp bark, but that of the old males is very hoarse. One of their great enemies is the Lämmergeier or Bearded Vulture.

These observations have been extracted from the account given of this species by von Heuglin, who discovered it during his Abyssinian expedition in 1853.

THE MALAYAN BABOONS. GENUS CYNOPITHECUS.

Cynopithecus, Is. Geoffr., in Belanger's Voyage, p. 66 (1834).

This genus has been constituted to include the single species

described below ; the characters of the genus being thus, perforce, the same as those of the species.

THE CELEBEAN BLACK BABOON. *CYNOPITHECUS NIGER*.

Cynocephalus niger, Desm., Mamm., p. 534 (1820).

Macacus niger, Bennett, Gard. and Menag. Zool. Soc., p. 189, with figure (1830) ; Schl., Mus. Pays Bas, vii., p. 119 (1876).

Cynopithecus niger, Is. Geoffr., in Bélanger's Voyage, p. 66 (1834) ; Lesson, Quadrum., p. 101 (1840) ; Gray, Cat. Monkeys Brit. Mus., p. 33 (1870).

Papio niger et *P. nigrescens*, Temm., Possess. Néerl. Ind., iii., p. 111 (1847).

Cynopithecus niger, vel *nigrescens*, Wagner in Schreb., Säugeth. Suppl., v., p. 61, tab. 6 (1855).

Cynopithecus nigrescens, Wallace, Malay Arch., i., p. 432 (1869).

Characters.—About the size of a Spaniel ; head oblong ; face very elongated, naked ; neck, hands, and feet also naked ; nose triangular, the sides erect, flattened behind nearly to the eyes, not extending to the end of the muzzle, but leaving a broad upper lip ; nostrils, with a long and broad partition between them, directed downwards and outwards—a character seen in the genus *Macacus*, and distinguishing this genus from the true Baboons (*Cynocephalus*) ; cheek-swellings parallel to the nose, distinct, but not conspicuously large ; supra-orbital ridges very conspicuous ; cheek-pouches large ; tail rudimentary, reduced to a fleshy tubercle, one inch long, and hardly visible. Length. 24 inches.

Fur long and woolly over the body ; especially long on the top of the head, forming a crest ; hair of the limbs shorter.

Face, neck, hands, and feet black ; fur all over the body and limbs jet-black ; callosities bright flesh-colour.

In the skull the maxillary bones are developed into strong lateral ridges corresponding in structure to those of the most typical Baboons.

Distribution.—This species is found far away from the habitat of the true Baboons, whose home is in the Ethiopian Region. The Black Baboon is an inhabitant of Celebes, one of the islands of the eastern portion of the Malay Archipelago. It is found, however, also in the neighbouring island of Batchian, further to the east—indeed the most easterly range of the *Quadrumania*—as well as in some of the Philippine Islands to the west. In both of these regions it is supposed to have been accidentally introduced by the Malays. In Batchian, Mr. Wallace remarks, “it seems so much out of place that it is difficult to imagine how it could have reached the island by any natural means of dispersal, and yet not have passed by the same means over the narrow strait to Gilolo—so that it seems more likely to have originated from some individuals which had escaped from confinement, these and similar animals being often kept as pets by the Malays and carried about in their praus.” Analogous to the distribution of this animal in the Philippines and Celebes is that of a genus of Parrots—*Prioniturus*—with racquet-shaped tails. The species of the latter genus are divided between Celebes and its small adjacent islands and the Philippines and the small islands adjacent to that archipelago, and present a curious case of the restricted range of a well-marked group.

Habits.—This interesting animal, geographically so isolated, lives in the luxuriant forests in small companies, and feeds chiefly on the abundant fruits which these forests provide. In its

disposition it appears to be more amiable and docile than the African Baboons. Some kinds of Monkeys, as Mr. Darwin observes, which have moveable ears, and fight with their teeth, draw back their ears when irritated just like Dogs, and then they have a very spiteful appearance. . . . Other kinds—and this is a great anomaly in comparison with most other animals—retract their ears, “and utter a slight jabbering noise when they are pleased by being caressed. I observed this in the *Cynopithecus niger*. . . . With the *Cynopithecus* the corners of the mouth are at the same time drawn backwards and upwards, so that the teeth are exposed. Hence this expression would never be recognised by a stranger as one of pleasure. The crest of long hairs on the forehead is depressed, and apparently the whole skin of the head is drawn backwards. The eyebrows are thus raised a little, and the eyes assume a staring appearance. The lower eyelids also become slightly wrinkled ; but this wrinkling is not conspicuous, owing to the permanent transverse furrows on the face.” When enraged, the *Cynopithecus niger* depresses the crest of hair on its forehead, and shows its teeth ; “so that,” as Mr. Darwin continues, “the movements of the features from anger are nearly the same as those from pleasure ; and the two expressions can be distinguished only by those familiar with the animal.” See the figures in Mr. Darwin’s “Emotions in Man,” &c., p. 136.

APPENDIX.

WHILE this volume was passing through the press, a valuable paper by Messrs. Oldfield Thomas and Ernst Hartert has appeared in the Hon. Walter Rothschild's Journal "*Novitates Zoologicae*." It deals with the Mammalia collected in the Natuna Islands by Mr. Alfred Everett, and the following additional notes must be recorded.

p. 20. TARSIVS TARSIVS.

Tarsius spectrum, Oldfield Thomas and Hartert, Nov. Zool., i., p. 655 (1894).

Mr. Everett says that on Banguran Island he could hear nothing of the existence of the Tarsier, but on Sirhassen Island the Malays described it to him unmistakably under the name of "Imb́ng."

p 33. NYCTICEBUS TARDIGRADUS.

Mr. Everett procured specimens of the Javan Slow-Loris on the island of Banguran, where, he says, it is probably not rare, though not often captured; the native name is "Kukáńg." The natives of Banguran did not appear to know the animal.

p. 100 *et sequent.* PROPITHECUS MAJORI.

Propithecus majori, Rothschild, Nov. Zool., i., p. 666, pl. xiv. (1894).

Adult.—Head and neck black. Face, snout, and ears naked, and of a blackish colour, encircled by a broad band of long white hairs, joining under the throat, slightly mixed with darker hairs. Rest of fur, including the tail, white on the upper surface; back and upper rump dark brown. The large white patch on and between the shoulders much grizzled with brown hairs. Under side of hind-limbs, to just below the knees, blackish-brown. Inside of hind-limbs down to the heel also brown, joining the colour of the upper surface, thus forming a continuous dark stripe along the legs. Inner and upper surface of arms, thumb, and two following fingers, deep blackish-brown; throat, chest, and greater part of abdomen, deep brown. Size perceptibly larger than that of *Propithecus verreauxi*, with the tail longer.

This species of *Propithecus* is nearest to the typical *P. verreauxi* of Grandidier, which is white, with the top of the head black, and the lower back and rump greyish-brown, but is no doubt an entirely different species. (*Rothschild, l.c.*)

Distribution.—Antimosy country, S.W. Madagascar.

shoulders and middle of the back ; whiskers long, directed backwards, almost concealing the ears ; hair on the lower back, arms, thighs and legs short ; callosities large, and the surrounding part of the buttocks nude ; tail slightly shorter than the body, arched at the basal third, then descending perpendicularly to its termination, which is tufted ; under surface of body and inner aspect of limbs thinly haired ; fourth finger and second toe strongly clawed.

Face flesh-coloured, darker round the margins of the mouth, lighter round the eyes ; snout, chin, eyebrows, ears, and naked parts of the hands and feet, dark flesh-colour ; general colour of the fur over the body ashy-grey, lightly washed with greenish—the hairs being ringed with alternate bars of black and greyish-green ; the head, the mane on neck and shoulders, and the front part of the body ashy-grey, washed with greenish ; whiskers greyish-white ; hind part of body paler than the fore ; fore-arms and legs greyish-black or almost black ; under side of body greyish-white ; tip of tail darker ; callosities and neighbouring nude parts bright scarlet. Length of body, 26 inches ; of tail, 15 inches ; height, when standing erect, 4 feet ; when sitting, $2\frac{1}{2}$ feet.

Females and Young Males.—Similar to adult males in coloration, but having no mane ; the females of the same size as the males.

Both sexes possess laryngeal pouches or air-sacs, extending down the neck nearly to the arm-pits, and connecting with the windpipe by a single opening above the larynx.

Facial portion of skull proportionately larger than the cranial. Top of skull and forehead flattened ; brain-case and front of cerebrum small and intruded on by the orbits ; the latter directed forwards and outwards.

Distribution.—Arabia, from the plains up to 9,000 feet; Abyssinia, and the Soudan.

Habits.—The Arabian Baboon, or “Tartarin,” as it is often called, is gregarious like its allies, occurring in troops of from two hundred and fifty to three hundred individuals. When full-grown, they are very bold and ferocious. They feed on fruits, berries, and the tubers of an edible grass; but their chief food consists of insects, and such small animals as they find under stones, or among the rocky cliffs and ravines, where they usually dwell, for they seem to avoid the wooded country.

They have a loud voice, uttered as a grunting bark. They are said to be extremely intelligent, “astonishingly clever fellows,” as one traveller records:—having chiefs whom they obey implicitly, and possessing a regular system of tactics in war, with the posting of sentinels on pillaging expeditions. They have variously modulated cries, to warn, to indicate safety or false alarm, or to direct the general movements or conduct of the troop. “The old males,” as Mr. Blanford narrates, “are always most conspicuous animals, all the fore part of their body being covered with long hair. They usually take the lead when the troop is moving; some of them also bringing up the rear; others placing themselves on high rocks or bushes and keeping a sharp look-out after enemies. A troop collected on a rocky crag presents a most singular appearance. I several times saw large numbers assembled around springs in the evening in the thirsty Shoho country. . . . On such occasions every jutting rock, every little stone more prominent than the rest, was occupied by a patriarch of the herd, with the gravity and watchfulness befitting his grizzled hair, waiting patiently until the last of his human rivals had slaked his thirst and that of his cattle. Around, the females were mainly occupied in taking







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